UNIVERSITY COLLEGE LONDON

ANNUAL REPORT 1980-81

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FOREWORD BY THE PROVOST

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PART I. A GENERAL RETROSPECTIVE VIEW

A retrospective view of the session 1980–81 could, naturally, be dominated by painful recall of the traumatic sequence of body-blows suffered by the University of London and by all its component institutions; including UCL in particular. A temptation to remember only those blows needs correction, however; and that is why I have chosen in this Foreword to follow a brief account of the four hardest blows from which UCL suffered by extended reference to a series of developments of a more encouraging nature where the common theme is 'academic/industrial collaboration'.

1. *Policy on overseas students*

The blows began with clear confirmation that University College London, along with the other major metropolitan centres of teaching and research in fields of national and international importance, could not avoid severe financial losses resulting from the Government's policy on overseas students. Such London centres had long been beacons for excellent students from all parts of the world; and the whole educational environment at UCL had been enriched by the presence of one such visitor among every six students (the same proportion as for the University as a whole). The potential impact of a consequential progressive withdrawal of one part in six from the College's UGC-determined resources, which the Government's policy implied, was seen as a most inappropriate penalty against institutions for being attractively situated and academically distinguished.

It soon became clear, unfortunately, that at most half of this loss of resource could be recovered from fees charged to overseas students at the minimum permitted rates (£5,000 for clinical courses, £3,000 for other 'laboratory' courses, £2,000 for non-laboratory courses; the corresponding figures in 1981–82 will be £6,000, £3,600 and £2,500). Furthermore, the extra disincentive of the higher fees for 'laboratory' courses was clear from the fact that overseas students reading science and engineering were reduced in number much more than those taking arts-

based courses (even though the UCL courses in engineering and applied science had always been specially popular with overseas students). Careful study of these figures indicated that the College's financial position would not be improved by any policy of charging above-minimum fees . . .

Two later, but minor, mitigations of the original Government's policy on overseas students have been noted with gratitude although their significance should not be exaggerated. Recognition that the policy was posing a grave threat to certain university postgraduate work of national importance led the Government to offer a total sum of £5,000,000 to the university system as a whole in 1980–81 to lessen that threat. The above-noted special dangers to the major metropolitan centres of nationally important postgraduate work were recognized through the University of London receiving three-quarters of the total (£3,750,000); and, out of that, UCL was allocated £320,000. This sum is being used entirely to pay for the cost of staff reductions under (for example) the Premature Retirement Compensation Scheme, such as are made necessary by the worsened financial position if it is to be possible for the College's nationally important research and development work in engineering and science to be maintained.

The other mitigation was a decision that European Community students would be treated as home students. Although this redefinition reduced only slightly the all-important 'proportion of overseas students in 1979–80 at UCL' (important as determining the proportional resource reduction), the College and the whole university system welcomed a policy of encouraging EC students by charging them home fees. All the more regrettable was the Government's decision, later in the year, to set substantially reduced targets for *combined* numbers of home and EC students; an action which, inevitably, must lead to pressures opposing acceptance of EC students.

2. *Additional 'volume cuts'*

The severity of the second heavy blow to the University of London could be estimated only in July, when it became clear that the University's share of the so-called 'volume cuts', defined in the 1981 Budget as resource cuts *additional* to those associated with numbers of overseas students, would in no way take into account London's special characteristics; whether its capital-city

attractiveness to good overseas students, or the national importance of its contributions to research and higher education. The severity of this second blow has been passed on in full to University College London: far from receiving, as had British universities comparable in distinction to UCL, a treatment rather better than the national average in the summer of 1981, the College has been forced painfully to accommodate itself to a significantly below-average treatment. Although it will be in the session 1981–82 that the Academic Board and the College Council need to take many of the hardest decisions that are required as part of this accommodation process, a serious and useful start has been made in 1980–81, through a drastic seven-point economies plan which has received the fullest backing of staff throughout the College.

3. *The University's attempt to reverse the trend towards de-centralization*

The two blows to the University of London that have so far been described were externally administered. Unfortunately, the third and fourth were the direct result of action within the University itself. They were the result of a mistaken attempt to reverse the whole post-war tendency of London's federal University towards greater administrative de-centralization. This attempt was typified, in the context of the setting-up of more than one Working Party on medical education in London, and of a further Committee concerned with all other aspects of the University's work, by invitations to them to carry out academic planning of the most detailed kind.

The consequences were a clear illustration of the principle that there are limits to the size of institution for which detailed academic planning processes can be carried out effectively. Within every British university institution, today's requirements for the most stringent economy measures pose two problems: not only (i) to be able to identify in detail all the places where economies can be made with least academic damage, but also (ii) to be able to secure those internal agreements to such identifications that are required if action is to be taken. The experiences of 1980–81 demonstrate clearly that an institution like the University of London, with the teaching of its 40,000 students and the research work of its staff spread out over (and to some degree beyond) a 10-kilometre area comprising the busiest streets of a

large metropolis, is too big for the achievement of these vitally important objectives to be centrally directed.

By contrast, every School of the University can fairly lay claim to possess effective mechanisms along these lines. Although UCL (with its 6,000 students) is the largest School, its topographical compactness within a Half Kilometre Square avoids fragmentation. It allows the Provost and several of his senior colleagues to have a good general knowledge of the academic work in all parts of the College, so that they can effectively referee the processes by which academic claims from all the different Departments are judged and compared. Equally, the compactness brings about an important element of mutual appreciation between different areas of the College, which facilitates the acceptance of compromises that are seen as necessary to minimize damage to academically valued activities. The same advantages, furthermore, appear to be present in each of the other Schools; however, they are not apparent in the University as a whole.

At this time of exceptional financial difficulty for the University of London, administrative effort that is both effective and sensitive to academic needs is inevitably in short supply in relation to the demands made on it. Such high-quality effort, of course, is available both centrally and in Schools. Yet the limited amount of such effort that is available can achieve a far greater range of acceptable economies when deployed within a School than when deployed from the centre. That is because the processes of identifying in detail, and of securing assent to, savings that are not too damaging academically can be more efficiently carried out on the modest scale of a School.

This is the primary argument for an accelerated process of administrative de-centralization within the federal University of London. Such a process need not, and should not, involve any diminution in the active academic collaboration within the University that already exists; especially, as between Schools that are relatively close together . . .

Such near neighbours, too, are well placed to obtain by bilateral agreement those economies that can be achieved in a federal University through cooperative action; for example, cooperation between independent Schools to cut costs through sharing some common service. Once more, it is topographical compactness that gives efficiency to such cooperative agreements

between independent near neighbours. Birkbeck College and UCL believe that they can work together to demonstrate to the University as a whole the efficiency of bilaterally concluded arrangements. Another important instance where major benefits are expected is the planned Joint School of Medicine between UCL and The Middlesex Hospital Medical School.

The University Grants Committee is, of course, well placed to take a national view of how the academic activities of (say) University College London fit into the British university pattern; and to go on from that to determine appropriate grant allocations, student numbers targets, etc. Essentially, the UGC does this at present for all of the Schools of the University; yet the conventions require UGC to communicate only totals across the whole University; after which a second exercise by the Court of the University has to re-distribute such totals among the Schools.

In such a second exercise the advantage of a national viewpoint on London's affairs is lost. Furthermore, it becomes increasingly difficult to argue that there is any counterbalancing gain from more local scrutiny on the scale of a body as massive and complex in its institutional arrangements as the University of London.

In Gower Street we are conscious of how straightforward it would be for the work of reporting on building capacity and maintenance, on capital expenditure, recurrent expenditure and student load, and of making cases for support from UGC funds, to be done directly between UCL and UGC. In this context we note that the size of UCL by any criterion is already above the average size of the university institutions with which UGC is dealing; it is also rather typical in its general balance of academic activities. To deal directly with UCL would be natural for UGC; also, it would avoid the need for work that is already gone over in detail in both places being gone over additionally in the Senate House. In short, arrangements such as apply already to University College Aberystwyth might fruitfully be applied to University College London.

In 1980–81 an immense volume of effort was devoted by UCL to submitting arguments such as these, together with a wide range of statistical and academically descriptive material, to the University's Committee on Academic Organisation. The need for massive effort to inform a potentially influential University Committee seemed unquestionable; though that

effort could ill be spared from the urgent academic-administration requirements of UCL itself. Yet the massive effort was finally seen to have been, essentially, wasted after the Discussion Documents put out by the Committee had led to reactions within the University so adverse that the Committee's planned programme of work was largely abandoned. In the meantime, those Documents had dealt a heavy blow to the University; mainly, by suggesting over-simplified possibilities for large savings through drastic proposals, not properly supported by compelling academic argument. It was too easy for the world outside to assume that it was indeed feasible for savings of this magnitude to be achieved within London University; whose overall grant position (see above) must have been adversely affected by the over-simplified views put across in those Documents.

4. *Delays to the formation of a Joint School of Medicine*

The fourth heavy blow to be described, and the second to be administered by the University on itself, was typical of those resulting from the University being too large for processes of detailed academic planning to be effective within it. Unfortunately, it produced many adverse effects, including a prolonged interruption of UCL's own plans, already referred to, for setting up, with the Middlesex Hospital Medical School (MHMS), a Joint School of Medical Education.

This idea, long attractive to both parties, had become a practical proposition in October 1979, after the Working Party under the chairmanship of Lord Flowers had suggested it and established that it need not be ruled out by the then separation of the two Schools (separation 'on paper' at least) by the boundary between two Regional Health Authorities (N.E. Thames and N.W. Thames). Later, this valuable prediction was amply substantiated when the Secretary of State for Health and Social Security made the new determination of boundaries: the two District Health Authorities that included University College Hospital and The Middlesex Hospital were combined into a single new District Health Authority. This was given the attractive name Bloomsbury D.H.A. and is administratively within the N.E. Thames Regional Health Authority.

In the meantime, the University's Joint Planning Committee had put to the special meeting of Senate in September, 1980 a 'package' of proposals selected from those originating in the Flowers Working Party. These included the excellent proposal for a Joint School between UCL and MHMS (a School which, additionally, would incorporate certain postgraduate institutes). However, attempts on the Joint Planning Committee to remove from the 'package' one particular proposal that seemed indefensible on academic grounds (suppression of pre-clinical teaching at King's College London) had not succeeded. That had led the Senate to vote against the 'package' as a whole; although it agreed to encourage the formation of Joint Schools between actively consenting partnerships (like that of MHMS and UCL).

Unfortunately, the University then embarked upon a new academic-planning exercise in a copiousness of detail far greater than was appropriate to an institution of its size. Ultimately, it led to another Senate vote, in March 1981, to suspend all work on forming the UCL/MHMS Joint School while an alternative 'option' of massive complexity was studied. That alternative was only abandoned after an extremely lengthy and detailed investigation. Thus, positive action to begin to reap the economic and academic benefits of the Joint School is becoming possible only in the session 1981–82, over a year later than would have happened if the University had not held action up through attempts to carry out an over-centralized exercise in detailed planning. . .

5. *Academic/industrial collaboration*

A general retrospective view of the session 1980–81 would be seriously misleading, however, if it were devoted exclusively to the four heavy blows suffered by UCL; and neglected to highlight at least a few out of the many satisfactory developments in the academic work of the College that occurred during the year. The College takes its greatest satisfaction, of course, in the achievements of its students; whose successes have once again been most impressive in all academic areas of the College. I may add that, even in the present parlous state of the job market, graduates from UCL continue to be placed very satisfactorily in suitable positions. There is great satisfaction also in the fact that the original work published by the College staff (as detailed

later in this Report) continues to make contributions of major importance within every main subject area studied at UCL.

On the other hand, it is inevitable that any group of highlights such as can appear in any single year's impressionistic retrospect must be selected from one or two limited subject areas. Thus, last year, I featured examples from the humanities and from the clinical sciences.

In this report, there is just one rather general theme I want to highlight: the theme of academic/industrial collaboration. It was always a theme which found a much readier acceptance in the College inspired by Jeremy Bentham's utilitarian philosophy than it had found within more traditional foundations . . . Above all, this College pioneered the formation of strong engineering departments acting, in cooperation with industry, as major sources of engineering innovation; and it demonstrated the special value of the type of education for potential engineering innovators that can be provided in such departments.

To exhibit the continuous pursuit of this theme at UCL over almost a century at one of the growing points of engineering (Electronic and Electrical Engineering) I have devoted Part II of this Foreword to an extended essay entitled 'Bloomsbury Electronics: the Fleming Tradition'. It traces the background (i) to the development of advanced teaching in Electrical Engineering at UCL from Ambrose Fleming's appointment as Professor of the subject in 1885; (ii) to Fleming's close and fruitful cooperation with the industrial companies that were successfully exploiting the inventions of Swan, Edison and Marconi; (iii) to the birth of electronics in Gower Street in 1904 when Fleming himself invented the thermionic valve; (iv) to the active and vigorous continuation of a 'Bloomsbury Electronics' tradition under Fleming's five successors as Head of Department; (v) to a selection of the more exciting innovations in electronics taking place in the Department today.

Readers of my lecture 'Academic Innovation' (published in May, 1980 in the Journal of the Royal Society of Arts) will of course remember similar stories, more briefly recounted there, about innovation in education and research at UCL in other branches of engineering; especially, Mechanical Engineering since Alexander Kennedy's appointment in 1874; and similarly Civil and Municipal Engineering since 1882, and Chemical and Biochemical Engineering from 1923 onwards. All of these three

Departments today are exceptionally strong engineering departments acting, in cooperation with industry, as major sources of engineering innovation. Thus, a high level of national importance must be attached to the successful preservation, not only of 'Bloomsbury Electronics'; but, more comprehensively, of 'Bloomsbury Engineering' as a whole.

Today, the College is greatly assisted in the further extension of all its energetic activities in academic/industrial collaboration by the distinguished representatives of engineering industry serving on its Council as 'lay' members, whose support and advice is deeply appreciated. These include an eminent representative of the Civil Engineering profession in Mr Roy Oakley; a leader of the Electronic and Electrical Engineering industry in Mr Peter Laister, Managing Director of Thorn/EMI; and, at the apex of UCL's hierarchy as the new Chairman of the College Council from the beginning of the 1980–81 session, the distinguished Chairman of Vickers, Limited, Sir Peter Matthews. In the present context, I must add furthermore that several moves to extend academic/industrial collaboration not only in Engineering but far more widely within the College have been strongly supported by Council members in general.

Special mechanisms of great importance for achieving this are referred to elsewhere in the Report. Thus, the session 1980–81 was a second very successful year of full-time operation for the Academic Services Unit, under the direction of Mr B. B. Nutt, which gives invaluable help to members of staff in making arrangements for cooperation with industrial firms and other outside bodies that are satisfactory academically and financially. Again, the Medical Instrumentation Unit, under the direction of Dr D. Parker, was set up (within the joint UCL/UCH Department of Medical Physics) during 1980–81 to ensure appropriate arrangements for industrial exploitation of that Department's important medical-instrumentation developments.

Simultaneously, yet another relatively novel idea began to come to fruition. In my capacity as a Professorial Fellow of Trinity College, Cambridge during the nineteen-seventies, I had been a member of the Committee concerned with bringing into being a 'science park' on Trinity College land in Cambridge. This 'park' was used to accommodate industrial research laboratories in fields where close collaboration with Departments of Cambridge University might be mutually advantageous. That back-

ground makes me happy to announce that, during 1980–81, University College London took steps to set up a 'science park' in Bloomsbury! In fact, a negotiation with the scientifically distinguished international pharmaceutical firm Sandoz was carried to an advanced stage. If it is satisfactorily completed, a Sandoz Institute for Medical Research, London will be set up in Gower Place, W.C.1; more precisely, in the two upper floors of the Kathleen Lonsdale building. The firm will completely renovate this (at present) somewhat decayed accommodation, which long ago had been acquired by the College through funds raised on public appeal; and the arrangements will additionally allow UCL (at no cost to itself) to obtain an equal amount of good new space for academic purposes situated elsewhere in the College.

It is expected to be most valuable to the College's areas of special scientific strength spanning pharmacology and the neurosciences that the Sandoz Institute for Medical Research will be concentrating upon long-term research work at a high academic level directed especially towards developments in neuropharmacology. This is a field where it is particularly likely that specific agreements between UCL Departments and the Institute to pursue collaborative research will be found mutually beneficial. Equally, the students of the College in pharmacology, medicinal chemistry and allied fields are expected to benefit; above all, from arrangements for well qualified staff of the Institute to give them courses that can help them to a deeper and fuller understanding of pharmaceutical research and development.

I must, however, emphasize that our localised agreements to cooperate with one firm in particular areas of scientific research or education are not to be regarded as creating any obstacles whatsoever to other firms within the same sector of industry from closely collaborating with UCL. Actually, the College is deeply involved, and aims to become even more deeply involved, with several of the world's leading pharmaceutical firms in co-operative research programmes. More generally, as must be clear from everything included in this section of my Foreword, University College London is determined to take the most vigorous steps to foster work of academic/industrial collaboration in every field where this is mutually advantageous.

6. *The 150th Anniversary Appeal*

A general retrospective view of the 1980–81 session at UCL must not be concluded without a reference to the 150th Anniversary Appeal, even though a special Section of this Report is, of course, devoted to so important a theme. Above all, I should like to express great satisfaction at the fact that, by the end of the session, the total of gifts and promises achieved through private approaches to well-wishers of the College had already reached the round sum of half a million pounds, and I shall be delighted to announce this very encouraging degree of initial success at the public launching of the Appeal in the presence of the Chancellor of the University, HRH Princess Anne, on 13 October 1981.

The whole College's warmest thanks are due to all our well-wishers who contributed so generously during this initial period prior to the Appeal's public launch. The individual donors include large numbers of present and former members of the College. The corporate donors include several trusts and foundations with strong interests in higher education and research, and also a wide range of companies; the latter being influenced, in many cases, by the College's long-standing and active involvement in academic/industrial collaboration.

Further special thanks for the success of the Appeal to date are due to Lord Goodman and to all of the members of the Appeal Committee under his eminent Chairmanship. I am also extremely grateful to Professor D. W. James, Vice-Provost, for generously, and vigorously, taking on the Directorship of the Appeal; as well as to the Appeal Office's devoted staff.

Finally, there are three persons whom I would wish to thank publicly for priceless help in all of the matters referred to in this retrospect of 1980–81; including vital assistance in all the College's general financial problems as well as in the extremely important matter of initial approaches to well-wishers in regard to the Appeal. Each of the three has recently come to the end of a long and greatly distinguished tenure of an important post within University College London; which, at the same time, proudly continues to number all of them among its members.

Thus, Sir Francis Sandilands, who held the UCL Treasurership with the greatest distinction from 1973 to 1981, and to whom the College is so deeply indebted, became Honorary Fellow during the session 1980–81. We greatly look forward to

seeing much of him during his (partial) retirement; in the meantime, we most warmly appreciate the willingness of the outstandingly qualified Mr Hugh Priestley to assume the exacting duties of the Treasurership from 1 October 1981.

Actually, it is seventeen years since Professor R. E. D. Bishop, who held the Kennedy Professorship of Mechanical Engineering from 1957 to 1981, became a Fellow of UCL. Alongside the lustre he has brought to our Faculty of Engineering, his general contributions to the life of the College have been priceless, and Brunel University is much to be congratulated on its choice of Vice-Chancellor.

Finally, the University of London as a whole is exceptionally fortunate that our own new Vice-Chancellor is Professor Randolph Quirk. English studies at UCL were raised from an already very high level to an internationally commanding position during Randolph Quirk's tenure of the Quain Professorship of English Language and Literature; and he is another Professor who, additionally, has brought inestimable general benefit to the College through his wise statesmanship. Fortunately, alongside his Fellowship of UCL, he retains a Professorship within the English Department, where the renowned Survey of English Usage continues to benefit from his unsurpassed knowledge and experience, even while it shares such benefits with a great University community on the scale of England's capital city.

1. *Ambrose Fleming and the birth of electronics*

Ambrose Fleming was born at Lancaster in November 1849; but, five years later, his parents moved to Tufnell Park in North London. At the age of fourteen he was sent to University College School, which at that time was still directly attached to University College proper. (Indeed, it occupied a substantial part of the College's main building; from which the School was finally to move only in 1907 to a position of complete independence on its present Hampstead site.) Ambrose walked a total of five miles every schoolday, from Tufnell Park to Bloomsbury and back. In Gower Street he had the benefit of a school education different in two important ways from that provided in either the public schools or the grammar schools of the period; both in the complete absence of flogging, and in the strong emphasis placed upon teaching of mathematics and the sciences.

After passing the London matriculation examination at the age of sixteen, Ambrose Fleming became a science student in University College itself in the autumn of 1866. That date of entry made him a member of the very first group of students to benefit from Carey Foster's introduction of physics teaching by practical classes. Also, in mathematics he received a strong and abiding influence from the last year of lectures by the illustrious Augustus de Morgan. So his timing was excellent! Furthermore, practical chemistry was by then being taught by an exceptionally inspiring Professor: Alexander Williamson.

Fleming studied full-time for two years, and was a part-time student for another two while earning a living as a Stock Exchange clerk. Finally, in 1870 he was one of the eleven candidates successful in the University of London's B.Sc. examination. Five of the eleven were from University College. 'Firsts' were obtained by Fleming and one other candidate.

Fleming then returned to Lancashire, as science master at Rossall, where he seems to have made an excellent teacher; but after five terms he was desperately keen to pursue his scientific studies again and successfully 'implored' his parents to be allowed to come back and live at home while working in the Royal College of Science in South Kensington. There, he became a Research Assistant to the Professor of Chemistry, Edward Frankland. Another of Frankland's Assistants working alongside

Fleming was Meldola, who later achieved chemical eminence . . . Frankland had been choosing his Assistants well for years; an earlier choice, Frederick Guthrie, was by now Professor of Physics in the Royal College, and Fleming was soon collaborating in Professor Guthrie's researches also. When Guthrie founded the Physical Society in 1874 he picked on Fleming to give the very first paper read before that Society; a paper (*Proc. Phys. Soc.* vol.1, p.1) combining exciting new experiments in electrochemistry with a most penetrating discussion.

In spite of this, Fleming's parents laid down that by June 1874 he must become fully self-supporting, and he accordingly spent three years as a science master at Cheltenham. Here he developed a first-rate laboratory for teaching chemistry and physics, and also used it to pursue some researches in his spare time. These included one of the first successful experiments in magnetohydrodynamics: when dilute sulphuric acid flowed down a glass tube between the poles of a powerful electromagnet he showed that an induced electric current flowed, in a direction perpendicular both to the fluid motion and to the magnetic force, between two platinum electrodes sealed through the glass. He read a paper on this experiment to the Bristol meeting of the British Association in 1875.

At this time he was beginning to study the revolutionary new theoretical work of James Clark Maxwell, whose great text *Electricity and Magnetism* had been published in 1873. He soon became convinced that an essential requirement for future successful researches in this field would be a deeper understanding of those recondite mathematical theories. Maxwell had in 1871 been appointed as the first Cavendish Professor of Physics at Cambridge. Finally, Fleming, against the opposition of his parents, decided to give up his £400-a-year job in Cheltenham and actually become a student again. He sat the scholarship examination at St John's College and finally went up to Cambridge in 1877 on a £50-a-year scholarship; having already arranged with Professor Guthrie in South Kensington for this pittance to be supplemented by a £50-a-year Examinership in physics at the Royal College.

The apparent discrepancy between someone being an examiner in London and a student in Cambridge was not due to any inferiority of London standards. Experimental physics and chemistry, in which Fleming was already distinguished, were

much stronger in London. He had to go to Cambridge, however, like Reynolds before him, to obtain the advanced applied mathematics he needed. It was W. H. Besant, the St John's mathematics 'coach', who gave him this firm mathematical foundation so essential for understanding Maxwell and for Fleming's own subsequent researches.

Actually, Cambridge had as yet completely failed to adjust to having a Professor of Physics, and Maxwell's lectures were very badly attended.* Except for those with determination of a Fleming, the preparation needed in order to appreciate the work of Maxwell was dauntingly formidable. During the last two years of this celebrated scientist's life, before his death from cancer in 1879, his lectures were attended by Fleming and one other student – an enthusiastic American; who exclaimed that Maxwell 'is great! He doesn't come here and tell us what he has read out of books. He gives it us hot from his brain.'

These, incidentally, were days when in Glasgow the lectures of Professor William Thomson (later Lord Kelvin) were being attended by over a hundred students . . . Nevertheless, in Maxwell's audience of two, the future was being determined through the meticulous attention paid by Ambrose Fleming, whose beautiful notes of those marvellous lectures were donated by him to the Cavendish Laboratory in 1931 to celebrate the centenary of Maxwell's birth.

While at Cambridge, Fleming published another paper; this time, on a method of improved accuracy for comparing the resistances of different standard coils in the Cavendish Laboratory. He obtained the London D.Sc. in 1879 (a year before his Cambridge B.A.) and from November 1879 combined a part-time position as scientific adviser to the newly formed Edison Telephone Company of London with continued studies in Cambridge.

To that part-time post he added, early in 1882, a full-time position as electrical adviser to the Edison Electric Light Company. Actually, this exciting opportunity meant *giving up* a Professorship at the recently formed University College Nottingham to which he had been appointed a few months earlier.

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*Rather as those of Isaac Newton, a similarly early Professor of Mathematics, had been two centuries earlier.

These were the early days of dynamo development and Fleming successfully persuaded the Admiralty to let him install an Edison dynamo in a troopship, H.M.S. *Mooltan*. Soon afterwards the merger with the Swan Electric Light Company helped Fleming to become well acquainted with Joseph Swan and his techniques for producing very uniform carbon filaments for electric lamps; techniques which Fleming was later to find very useful.

In 1884, Fleming attended the British Association meeting in Montreal, and then proceeded to New York, to study the newly developed Edison system for supplying electric light to part of New York's business district. He reported fully to the Edison Company of London about these exciting developments on his return; soon after which, however, he received the call back to Bloomsbury, in the form of an invitation by the Council of University College London to occupy the newly formed Professorship of Electrical Engineering.

Of course Electrical Engineering in 1885, as a completely new academic subject, did *not* at once command large resources of space: Professor Fleming's teaching work in Bloomsbury, and his continuing and ultimately very fruitful researches, had for seven years to be carried out in one small lecture-room and one small laboratory. These, admittedly, were years when he was continuing to direct much of his energy into a variety of important consulting work, especially on the evaluation and improvement of transformers, as well as in greatly valued advice to the London Electric Supply Corporation and similar bodies.

In 1891, however, Professor Fleming decided to put the strongest possible efforts into a campaign to obtain adequate space at UCL for Electrical Engineering; an objective which, consequentially, was selected as one of those for the 1891 appeal by University College. The space needed was provided in the South Wing extension (facing on to Gower Street), designed by Roger Smith, the College's Professor of Architecture. Unfortunately, inadequacy of the total amount collected prevented the extension from ever being fully completed; and it is only now, ninety years later, that University College is at last making a further Appeal to allow that completion to take place, in accordance with a most architecturally harmonious design by Sir Hugh Casson, P.R.A.

In the meantime, even the incomplete extension was large

enough to give Ambrose Fleming a marvellous opportunity to plan and equip superb Bloomsbury laboratories for teaching and research in Electrical Engineering. These were opened in May, 1893 by the Duke of Connaught. Fleming, from then to his retirement in 1926, worked indefatigably with his admirable assistant W. C. Clinton (who also became his successor) to maintain the effectiveness of those highly advanced teaching laboratories.

The practical side of the Department's teaching work involved over a hundred different laboratory projects for students, each accompanied by meticulous directions written out in Fleming's very clear handwriting. The theoretical side, furthermore, was just as strong in consequence of Fleming's superb mathematical grounding. The 'student load' soon became close on fifty students taking this excellent course; they included two future Fellows of the Royal Society (S. G. Brown and Sir Joseph Petavel) and four future IEE Presidents.

The death in 1896 of the great submarine-cable pioneer Sir John Pender led to a memorial fund being launched, and Fleming succeeded in ensuring that his Department received the main benefit from the funds collected, which proved useful. As a corollary, the Chair which Ambrose Fleming held first and Eric Ash holds today became known as the Pender Professorship.

The research work of Fleming and his colleagues during his forty-one years as Professor covered many areas, some of which I have already referred to briefly. However, the most influential of all these areas of research activity began in the first year of his Professorship with a paper read to the Physical Society in June 1885. That paper described what it called 'molecular shadows' in carbon-filament lamps. They could be explained only on the assumption that a hot spot in the circuit generated what Fleming called '. . . a projection of molecules in straight lines in every direction. The trajectory of the molecules will be interfered with in some directions by the carbon filament'; leading to lines of no deposit 'which are molecular shadows of the loop'.

Fleming's further pursuit of this line of research was influenced by a surprising observation that had just been made by Edison, using a carbon-filament lamp in which was inserted a metal plate carried on the end of a platinum wire sealed through the glass. Briefly, a galvanometer placed between this platinum

wire and the point of entry of direct current through the carbon filament registered a response, whereas the same galvanometer registered no response whatever when placed between the platinum wire and the point of exit of the current. Edison had reported this as a curiosity but Fleming, with his deep interest in basic physical laws and their application in electro-technology, initiated a major research project aimed at studying it further. For this purpose, special carbon-filament lamps made by use of Joseph Swan's most refined techniques in the Edison-Swan Lamp Factory at Ponders End proved ideal. Fleming soon demonstrated that the hot carbon filament emits what he described as 'a torrent' of particles each carrying a negative charge. At that time, a decade before J. J. Thomson discovered the electron, Fleming had to assume that these particles were negatively charged carbon atoms . . . He described the work in an Evening Discourse at the Royal Institution in February 1890. Much later, he wrote: 'This was the first occasion on which I had lectured at the table made famous by the discourses of Davy, Faraday, Tyndell and Dewar, but to my great relief all my experiments went off well.' At the end Lord Rayleigh said to Fleming: 'you have given us a great deal to think about' (and, two years later, we find Fleming elected to the Royal Society).

In the eighteen-nineties, however, Fleming only returned occasionally to these intriguing phenomena, and mainly concentrated on two other subjects : his massive studies of the properties of transformers, and a pioneering series of researches on electrical and magnetic properties of materials at low temperatures, using facilities provided by Sir James Dewar. From all of his research papers, the benefits from Fleming's combination of experimental flair and mathematical grasp are evident.

Then in 1898 he met Marconi, who had just established stations for wireless telegraphy at Alum Bay in the Isle of Wight and also at Bournemouth. Much later, Fleming wrote: 'Happening to be at the latter place for a short holiday, I made a request of Mr Marconi to be allowed to inspect it, and he very kindly gave me permission. I do not even now forget my astonishment when I saw a telegraphic instrument begin to print down in the Morse Code of dot and dash the message "Compliments to Professor Fleming" which had found its way across twelve miles of sea and been picked up by an aerial wire 150 feet high attached to a mast in the garden of the house in which Mr Marconi was then

residing at Bournemouth.'

Fleming and Marconi then conspired together to give maximum publicity to the immense possibilities of wireless telegraphy using Marconi's aerials. Fleming had been invited to give the principal evening lecture to the Dover meeting of the British Association in 1899 and chose as his subject 'The Centenary of the Electric Current,' in reference to Volta's great discoveries of 1799. During this brilliantly successful lecture wireless messages sent from an aerial on the Town Hall, Dover were used to exchange greetings between the British Association President, Sir Michael Foster (a *former* UCL Professor) and the President of the French Association, which was meeting at the same time in Boulogne . . .

Immediately afterwards, Fleming became scientific adviser to the Marconi company, and produced in his Bloomsbury laboratory the first designs of the equipment for the famous Poldhu station in Cornwall. He was ordering the necessary alternators and transformers while Marconi was designing and building the aerials. The final tuning of the whole system was carried out by Marconi himself in November, 1901 before sailing for Newfoundland, where he soon astonished the world by picking up Morse signals transmitted from Poldhu.

A major difficulty in all Marconi's early experiments was the unreliability of the device used for detecting feeble alternating currents; namely, the 'coherer' which depended on the tendency of grains of metallic powder between two silver plugs to stick together or 'cohere' in response to weak a.c., so that the circuit's d.c. resistance was diminished. Fleming recognized that what Marconi really needed was a device that would rectify high-frequency alternating currents.

One day in Bloomsbury, in October 1904, he was concentrating on this difficult problem and then had what he later described as 'a sudden very happy thought'. He remembered his old experimental bulbs in which the space between an incandescent carbon filament and a metal plate had 'a one-way conductivity for electricity'. He asked his assistant, Mr Dyke, to assemble some equipment for generating feeble high-frequency currents, and he took out of a cupboard one of his old bulbs. The rectification experiment worked first time! – a mirror galvanometer being used to detect the rectified current.

So that is the story of how electronics was born in Blooms-

bury. Fleming at once began a period of furious activity using a wide variety of different designs for these bulbs, which he named 'valves' (*Proc. Roy. Soc.*, vol.74, p.476) and lodged his patent application on 16 November 1904. Actually, his contract obliged him to transfer all such patents to Marconi's Wireless Telegraph Company, which immediately began to use it as the basis of all their electromagnetic-wave detection devices . . . Three years later, triode valves were patented in America by Lee de Forest, but Fleming diodes continued to be applied in the main receiving devices used throughout the First World War, and helped to bring great prosperity both to Marconi himself and to Britain's young electronics industry.

2. *Continuing the tradition*

I now embark on a 'bridge passage' between the birth of electronics and present-day Bloomsbury activity in that field. Actually, the strong element of continuity, within UCL electronic and electrical engineering, between the first holder of the Pender Chair and the present day is due entirely to the influence of Harold Barlow, F.R.S., now in his fourteenth year as Emeritus Professor but still pursuing active research in the Department; which, originally, he had joined as a student in 1919. By 1919 Fleming was seventy and had given up personal research, but he too remained active in his advanced years, especially in lecturing and writing books, and continued as the Head of Department till 1926. (In his eightieth year, 1929, he was knighted.) In the meantime, Barlow had proceeded to a Ph.D. for research work concerned with the effect of electric currents on the friction of surfaces; and Fleming had, in 1925, appointed him to an Assistant Lectureship. Harold Barlow has remained on the active academic staff ever since except for his absence on war service, and was from 1950 to 1967 the fourth holder of the Pender Chair.

The second Pender Professor, W. C. Clinton, who had for so long been Fleming's assistant, organized an expression of the College's gratitude to Fleming on his retirement through a subscription to make possible the execution of Orpen's magnificent portrait. Clinton's brief tenure of the Chair was marked by his continued activity in the progressive conversion from steam to electric driving of a series of the largest compressed brick making plants in the country. In the meantime he kept up-to-date

the outstanding body of equipment for practical teaching of electrical engineering that Fleming and he had built up over the years.

The third Pender Professor was Reginald Kapp, who brought to the Professorship a wealth of experience gained in Kennedy and Donkin, the Consulting Engineers. Kapp, an outstanding power engineer, had been much involved with the electrification of the Southern Railway; accordingly, Kapp and Barlow between them were able to sustain both the power-engineering and the physical-electronics sides of the Fleming tradition during the 'thirties and 'forties.

One of Kapp's most interesting and valuable features as a teacher was his passionate belief in good technical writing, as shown in the active measures he took to ensure that electrical engineers trained at University College acquired special skills in the presentation of technical information. In a more national context, he founded a Presentation of Technical Information Society, which flourished for many years. Kapp, who retired in 1950, is remembered by older members of the Department as having possessed a particularly attractive personality and very wide interests; he wrote several books on philosophical themes and was a keen amateur musician, both as performer and as composer.

In the meantime, Harold Barlow had been making a name for himself in the nineteen-thirties by his researches in the parts of the discipline closest to physics. One outstanding work which he carried out at that time was on the conductivity of metals at very high current densities, of the order of $10^4 A/mm^2$, achieving these densities by using thin gold leaf as the conductor.

For the radar team being formed at the Telecommunications Research Establishment at the outbreak of war, Barlow with his splendid Fleming training based equally on practice and on theory was a perfect choice. He became the great wave-guide pundit, a role which culminated in his indispensable 1947 book 'Micro-waves and Wave-guides'. In the meantime, by 1943 the Royal Aircraft Establishment in Farnborough had needed a new Superintendent for its Radio Department, concerned with all the thorny problems of airborne radio; and, once more, Barlow was an ideal selection . . . When I, at a rather later period, became a Director of R.A.E. who was deeply involved in ensuring Radio Department's continuing good fortunes around

the nineteen-sixties, I soon learnt how Barlow's Headship of the Department during the war's last two years had given the Department's scientific foundations a most vital strengthening . . .

Back in Bloomsbury, a second Professorship was created at the end of the war so that Barlow could rejoin his old Department alongside Kapp. Soon afterwards, Barlow persuaded one specially gifted former colleague from R.A.E. Radio Department to join the staff at University College. This was Alexander Cullen who, later, was to become the fifth Pender Professor and, also like Barlow, to be elected to the Royal Society. By 1950 another important book appeared, this time under the joint authorship of Barlow and Cullen, entitled 'Microwave Measurements'. Barlow's succession to the Pender Chair in the same year initiated a period of very rapid build-up of research teams covering a wide range of electrical engineering and microwave engineering and physical electronics, and moving increasingly into modern optics.

As a first step in this process, a leading light from Metropolitan Vickers in Manchester was brought in as the second Professor. This was Frederick Brailsford, who later wrote the invaluable book 'Magnetic Materials'. Next, John Brown from Imperial College, who had just published *his* book 'Microwave Lenses', joined the staff as a Lecturer; this was just before Cullen left for a temporary but productive period in the North West on his appointment in 1955 as Head of Department at Sheffield. Soon, John Brown was collaborating closely with Barlow; with whom he jointly produced a major book 'Radio Surface Waves' before returning to Imperial College on appointment to an important Chair.

In the meantime, yet another acquisition, of very special significance, had been made: that of Eric Ash, who much later, in 1980, was to become the College's sixth Pender Professor. It is noteworthy that, like Fleming, Eric Ash was educated at University College School; and that, also like Fleming, he combines a deep involvement in the problems of the electrical industry with a profound insight into the fundamental physics that can be applied in finding solutions to those problems. He was already well known as a leading light in STL (Standard Telecommunications Laboratories, Limited) when he came to University College in 1963. Immediately he began to make a massive addition to the Department's strength through his

formation of a major group of workers in advanced physical electronics, and through his own remarkable researches which led to conferment of a personal Chair four years later, followed by election to the Royal Society in 1977.

I have the kind permission of Alexander Cullen to quote in connection with his return from Sheffield these explanatory words that he has written. 'A first-class department enthusiastic about research (and above all the presence in the department of Eric Ash) was the major factor in deciding me to accept the invitation to succeed Harold Barlow when he retired in 1967. The other main factor was the knowledge that Harold would be willing to continue in the Department as a Research Fellow'. The last remark, of course, might be taken as applying also, to a redoubled extent, in 1980–81 in that, with Ash having succeeded as Head of Department, Cullen is continuing as an S.R.C. Senior Research Fellow while (as we shall see) Barlow's own work as Honorary Research Fellow still proceeds fruitfully . . .

On the other hand, Cullen did soon decide to make some changes in the Department on his return from Sheffield. This determination was founded on a definite feeling of dissatisfaction with the Department's failure to make its qualities properly known to the world in general and to school leavers in particular. He immediately set about putting this right, beginning with a change in the name of that Bloomsbury institution, where electronics had been born six decades before, to Department of Electronic and Electrical Engineering. Simultaneously, he made the Department's interest in electronic engineering explicit by a separate course entry in the UCCA handbook! These and some other publicity measures quickly began to bear fruit in large numbers of undergraduate applicants with good qualifications for a course that offers a superb grounding in modern physical electronics.

At the same time, it was vital to maintain a full general coverage of electrical engineering, and that was why D. E. N. Davies, a noted authority on radar, signal processing and antennas, who also to some extent parallels Kapp in his wide knowledge of railway electrification, was brought into the Department's second established Chair to succeed Brailsford when he retired. This, too, proved to be an inspired appointment because the earlier distinction, and width of subject matter, of Davies's researches have 'bloomed' still further in the Bloomsbury environment . . .

Another admirable acquisition at about the same time was Dr J. R. Forrest, the son of J. S. Forrest, F.R.S. who had in 1940 founded the Central Electricity Research Laboratories at Leatherhead. Cullen in his major research programme on active antenna arrays soon found J. R. Forrest an ideal collaborator. Later, he gradually allowed John Forrest to take over the running of the antenna research programme, while he himself put his major energies into the important objective of improving the precision and convenience of instrumentation for microwave measurements.

Now, I have completed my 'bridge passage' giving an account of how Fleming's fine traditions were kept continuously preserved in the transition from the Department which he created to the present day. Finally, I want to give a selective account of a small part of the important innovative work that has recently been emerging from the laboratories of Ash and Davies and Cullen and Forrest and Barlow and some of their able colleagues.

3. *Recent innovative developments*

The bulk of the Department's research work, including all of it that I shall sketch here, constitutes the SRC-funded Microwave Research Unit. Originally, this name was appropriate for the obvious reason that the Unit's work was concentrated especially on the 'microwave' part of the electromagnetic spectrum. However, the same name was retained for convenience even after a great diversity of other parts of the spectrum, including laser light in particular, began to be every bit as important in the work of the Unit; a Unit whose members tend to argue, plausibly enough, that 'microwave' as a word can reasonably be applied to any very-small-wavelength radiation whose wave-like properties are being utilised.

Microwaves in this sense may, indeed, include not only light but also sound; although Professor Ash and his colleagues are typically concerned with sound at frequencies a million times higher than those to which our ears are sensitive . . . They have worked especially with sound of about 1GHz frequency, which in an aqueous medium has a wave-length 1.4μm like that of infra-red light. The scanning acoustic microscope developed by the group uses sound of about this frequency for many purposes, including that of probing biological tissue *in vivo*. The Medical

Research Council is actively supporting work by Roger Giblin on this application of acoustic microscopy; especially, because of the unique opportunities it offers the embryologists to study embryos in the earliest stages of cell division without interfering with the growth process.

For certain applications of scanning acoustic microscopy, using the reflection rather than the transmission mode, it is possible to aim at even higher resolution. This is to be achieved by using a gaseous medium such as argon (as another of Ash's colleagues, Dr Wickramasinghe, has done) to bring the wavelength at 1GHz frequency down to that of blue light. The sound beam, of course, shows up quite different material properties from a light beam; properties that may, quite often, be considerably more interesting. Actually, the gas cannot be used at atmospheric pressure because of excessive acoustic attenuation at these frequencies, but Dr Wickramasinghe has circumvented that difficulty by working with argon at a pressure of thirty atmospheres so as to give it an acoustic attenuation similar to that of water.

Another interesting new development in acoustic microscopy is Professor Ash's demonstration of the effectiveness of a system in which both the amplitude and the phase of the received signal are measured, digitised and recorded for each picture element. This is a superb means for comparing two successive images; and, in particular, for pin-pointing the changes which may have taken place in an object between the two recordings through a process rather analogous to double-exposure holography.

All the work on new acoustic methods of high accuracy, whether for medical applications or for non-destructive testing, requires a precise knowledge of the acoustic field that is generated. For these fields on a microscopic scale, conventional microphonic transducers are simply not small enough; but Professor Ash has developed a beautifully precise means of measuring the pressure fluctuations at any point by having them act at the apex of an aluminium cone, generating an out-going spherical wave which is then focussed on to a transducer within the instrument.

Of course, advanced electronic instrumentation today uses not only bulk acoustic waves travelling through a medium but also surface acoustic waves. These are the waves discovered by

Lord Rayleigh to be capable of propagation along the surface of a solid. For many years Professor Ash's research group has been one of the important centres developing devices that utilise those waves; and, increasingly, the group has recognized the need for a method which will measure the wave velocity to very high accuracy.

This is an area where the interactions between laser radiation and acoustic waves have proved most valuable. A very precisely focussed laser probe is, in fact, being applied like an interferometer to measure phase change to an accuracy of a few degrees over a path length of several hundred wavelengths. The resulting wave speed measurement to an accuracy of twenty parts per million is useful not only for the development of precision devices employing surface acoustic waves; it is equally valuable in the monitoring of processes for controlled impurity diffusion or ion exchange across solid surfaces.

Yet another development where Dr Wickramasinghe is playing a leading part, *and* where interactions between laser radiation and acoustic waves have proved useful, is becoming known as photoacoustic microscopy. Here, laser light is focussed using a microscope lens, and the object is scanned in a raster pattern as in television. The important point is that the laser is modulated at some acoustic frequency. Also, any spot on the object that significantly absorbs the laser light generates heat. That heat source, being modulated at some acoustic frequency, generates sound at this frequency in the gas cell containing the object, and a microphone detects the amplitude of the sound waves. This amplitude is recorded on a display which therefore gives an image of the pattern of surface absorptivity across the object at the frequency of the laser. Furthermore, the lasers used are tunable from 250nm to 750nm, so that the device can produce a varying image over a wide range of optical and ultraviolet frequencies.

One major objective of those working on modern optical systems using laser light is to achieve designs for integrated optical systems analogous to integrated electronic circuits. The well developed techniques available to Professor Ash's group in this whole field have, over the past few years, been greatly extended by Christopher Pitt. It is important for this purpose to be able to deposit an extremely pure thin film of an electro-optic crystal such as lithium niobate ($LiNbO_3$) onto a substrate.

For this purpose, an accurately controlled vacuum system involving molecular beams of lithium and niobium and controlled admission of oxygen appears most promising.

Another major thin-film enterprise by Eric Ash, Christopher Pitt and others is being carried out with the strong backing of a consortium of major British manufacturers including GEC, STL and Plessey. It is based on the possibility that a significantly cheaper and improved type of TV filter could be achieved by means of a zinc-oxide thin film deposited on a glass substrate. The problem is to develop a deposition technique producing uniform and accurately repeatable thin-film properties. For this purpose, Pitt is using a 'sputtering' technique at radio frequency in combination with several important control features. These include a 'cryo-pump' cooling coil to prevent water vapour contaminating the film, an optical monitor for ensuring a precise film thickness, and a dedicated mass spectrometer for ensuring that the residual ambient components (mainly nitrogen and hydrocarbons) are maintained at a partial pressure below 10^{-8} torr. The power supplies are supervised by a micro-computer that derives information from the various sensors in the system. The system looks highly promising in that the control features have been found to diminish losses when the film is used as a transducer from 18dB to 6dB, while also greatly extending bandwidth.

Many years ago Christopher Pitt developed sophisticated ion-exchange systems which have proved ideal for Eric Ash's micro-optical device developments. When soda-lime glass is immersed in a silver-nitrate melt there is spontaneous diffusion of silver ions into the glass, where they replace sodium ions and so produce a controlled increase of refractive index, allowing light to be guided in the thin surface film. Recently, Pitt introduced a most interesting and promising variant of this technique in which an applied electric field is used to enhance the ion exchange. Then he went on to discover that this variant would work effectively, without any of the inconvenience of using a melt, by simply inducing diffusion from a hot silver anode . . .

Just to give an example of an integrated-optics device made possible by these and other advanced thin-film techniques, I will briefly mention the joint work of Eric Ash and Christopher Pitt to design an integrated acoustic-optic spectrum analyser. This starts from an idea that is already well established: a radio-

frequency spectrum analyser with a bandwidth of as much as 1GHz is made possible if the rf signal is converted into a surface acoustic wave that acts to deflect a laser beam through an angle proportional to the surface acoustic wave frequency. For the integrated version of this device a beam expander was fabricated by interfering two laser beams in a photoresist film on a surface waveguide produced by the ion-exchange technique. Similarly, the focussing lens was formed by interfering a cylindrical wavefront with a planar wavefront. Now these components, together with the interface between them, are being combined in an integrated form on a lithium niobate substrate doped with titanium.

Although I am tempted to go into more detail about this extensive project, I believe I may already have paid enough attention to modern physical electronics on the microscopic scale; especially since I am anxious not to neglect the Department's modern developments of large-scale electronic systems in general, or of radar systems in particular. Actually, my transitional topic between various systems involving acoustic waves and modern radar systems is to be a recent success story about the development of an acoustic radar that is very effective for probing the turbulence in the winds at heights up to half a kilometre or so from the ground. These winds form the so-called atmospheric boundary layer where turbulence is generated as the winds interact with the ground, as a boundary with important thermal as well as mechanical-resistance characteristics.

Meterologists are interested in the turbulent variations in both temperature and velocity. Different boundary-layer conditions are commonly described by different values of two 'structure parameters' that relate the mean square difference of (for example) temperature at neighbouring points to the two-thirds power of the distance between them. Dr R. S. Cole at UCL developed his acoustic radar using audible sound at a frequency of 173OHz in such a way that the temperature structure parameter and the velocity structure parameter of the turbulence are both directly determined at various heights. The radar works equally well in the urban environment of Bloomsbury and in the open country. Experiments at the Meterological Research Unit, Cardington showed excellent correlation between measurements using the radar and those using the Cardington tethered-balloon facility. This and other calibration exercises

have completed the proving of the system which has now been taken over by various meteorological agencies.

Passing to radar systems in the strict sense, I begin with John Forrest's recent entertaining demonstration of the effectiveness of a so-called 'bistatic' radar system. This is an attractively flexible system where the passive receiving element may be at rather a large distance from the active transmitter. For example, a UHF radar receiver on the roof of the UCL engineering building monitors transmissions from Air Traffic Control radars at Heathrow, and also monitors the associated echoes from aircraft. The resulting raw data involve, of course, a large geometric distortion of the aircraft position indications because of the separation between transmitter and receiver. However, a 'real-time' very fast correction system using a microprocessor to remove these distortions has proved most effective for processing the target echo returns and presenting these in undistorted format on a conventional PPI display centred on Bloomsbury!

A project of much longer duration, originated by Alexander Cullen and, in recent years, continued very effectively by John Forrest, is aimed at bringing down the cost of radar systems based upon active phased arrays. These, as is widely known, are radar systems designed to avoid the need for any movement of the aerials; systems, in fact, where the beam is steered by varying the phase differences between emissions from different elements of the array. Low cost for such systems is being pursued in Bloomsbury through designing the elements in a simple modular form, with maximum usage of components in both transmission and reception within each module. The active solid-state rf source for each radiating element is synchronized to a common reference signal by means of a phase-locked loop. Then, phase-shift increments are applied within each module in response to instructions from a microprocessor that controls the steering of the beam. An eight-element array operating at 10GHz has been built and found very satisfactory. The design of the modules is now being transferred to a microwave-integrated-circuit construction using a 10W pulsed Gunn diode as the rf source. This project is being strongly supported by firms and agencies interested in automatic landing systems and satellite communication terminals.

I mentioned earlier that, when John Forrest took over work on active antenna arrays, it was possible for Alexander Cullen

to turn his main attention again to improved systems for microwave measurements. One of his principal objectives has been to devise a broad-band instrument capable of making accurate measurements of some unknown reflection coefficient in both magnitude and phase. Ultimately he showed that, with automatic control by a microprocessor, this objective can be achieved through an ingeniously designed multi-port coupler in which the only sensing elements are power meters. Professor Cullen is now very actively engaged in refining this design.

This is the point where I also refer with great pleasure to Professor Barlow's fruitful continuing researches based upon his encyclopaedic knowledge of waveguides. One of his very interesting projects is being pursued jointly with Cable and Wireless Limited, and is concerned with the potential of a quite new type of cable design. This would be one in which the conventional TEM mode of cable propagation is replaced by a dipole mode, with the object of making a significant reduction in attenuation. The idea is that, in an ordinary coaxial cable, the space occupied by the inner conductor does not carry any energy. Replacing the inner conductor by a circular arrangement of twelve parallel wires leaves the central region free for energy transport in the dipole mode and Professor Barlow's measurements have successfully demonstrated a twofold reduction in attenuation over a frequency range from 1 to 4GHz.

In addition, Harold Barlow has started to join enthusiastically in all the excitement about optical-fibre communication systems. Recently, he pointed out the great potential advantages of a completely novel waveguide design for optical fibres. This is one in which the refractive index has a constant value from the axis out to a certain distance; then it rises to a slightly higher value for a very short distance; and then it returns to the original value and maintains it as far as the boundary of the fibre. British Telecommunications is taking a strong interest in the potential attractions of this type of design.

Finally I come to the work of Professor D. E. N. Davies who is deeply involved, with his colleagues, both in modern radar systems and in new optical-fibre developments. I will, however, illustrate each of those areas of deep involvement merely by brief references to just two examples.

One of these is the exploitation for radar applications of the 'multiplicative' processing technique introduced by the radio-

astronomers. The idea is, for example, to utilise an apparatus which multiplies the signal amplitudes from *one* array of ten antennae at a spacing of five metres and from *another* array of ten antennae at a spacing of fifty metres. Such an apparatus is using twenty antennae, and yet the output is an extremely narrow beam; which, indeed, is exactly the same as if you had used 100 antennae at a spacing of five metres! There are many useful variants on that simple theoretical idea; of course, turning any of them into a practical system proves as usual to be a lengthy process, but the work already looks like having some extremely useful applications.

The other promising radar concept I want to mention represents a half-way house between the relatively slow and ponderous mechanical rotation of a large parabolic dish aerial and the cost and complication of the electronic scanning systems using phased arrays to which I have already referred. Briefly, the half-way house in question is based on a fixed parabolic aerial of special form with a carefully designed multi-element horn feed, tilted at 45° to the vertical, which rotates inside the dish to provide the necessary scanning. A substantial amount of work remains to be done on this, but there are indications that it may yield an attractively simple system for achieving fast scanning rates where these are required.

Last of all, the Group which D. E. N. Davies has been leading so effectively for many years has increasingly been giving attention to some quite new applications for optical fibres. These are applications going beyond the well established use of optical fibres in telecommunications over long distances. Some of the work, in which Professor Davies collaborates with Dr Brian Culshaw, is concerned with monitoring of processes in various types of hazardous environment including coal-mines. Other parts depend on the fact that optical fibres can be used not merely for data transmission but also for data acquisition. In other words, an optical fibre can be an invaluable sensing element for measuring changes of pressure, or strain, or temperature; essentially, because any such changes produce measurable phase changes in the laser light transmitted along the fibre. Similarly, acoustic fields can be picked up, as in the 'optical-fibre hydrophone', because of the modulation in the light signal which they generate. Davies and Culshaw have even demonstrated an optical-fibre gyroscope, based on the fact that the

rotation rate of a multiple loop of optical fibre generates a shift in the interference fringes between beams that have gone round it in opposite directions. In all cases, a sensor which produces a direct transduction of the quantity to be measured into an optical signal is ideal when the transmission of that signal is to be optical.

In Part II of this Foreword I have used advanced work in electronics *both* as an illustration of Bloomsbury Engineering; *and*, also, as an illustration of the role of strong university departments as major sources of engineering innovation. Equally suitable as illustrations of both matters would have been the Gower Street activities in naval ship design and offshore engineering; in artificial-limb design; in industrial crystallization, fluidised-bed combustion and biotechnology; or in structural-collapse investigations, transport studies and public-health engineering. I believe, however, that by concentrating upon just one story (that of the birth of electronics in Gower Street and its subsequent evolution at University College London from the first Pender Professor to the sixth), I may have been able to include enough significant detail to help in clarifying the ways in which a strong university engineering department works, in close cooperation with industry, as a major and continuously productive source of engineering innovation. It will be of vital importance to ensure that future reductions in levels of public expenditure in Britain are not allowed to strangle the effectiveness of those principal centres of continuing innovation and associated advanced education where so much of our engineering future is being determined.

Chancellorship of the University

In December 1980 the College was saddened by the news that Her Majesty Queen Elizabeth the Queen Mother had tendered her resignation as Chancellor of the University of London. In an association with the University extending over twenty-five years Her Majesty had taken a lively interest in its affairs, and with her unfailing enthusiasm and unstinted kindness had been a continuous source of inspiration to many.

Her Majesty had twice visited the College; in February 1956, and again in November 1977, at the 150th Anniversary, on which occasion she was made an Honorary Fellow of the College.

The recommendation of the Standing Committee of Convocation that Her Royal Highness the Princess Anne, Mrs Mark Phillips, should be invited to accept the nomination for the office of Chancellor was not unanimous. Two alternative candidates were put forward – Mr Jack Jones, former General Secretary of the Transport and General Workers Union, and Mr Nelson Mandela, president of the African National Congress of South Africa. Interest in the matter became nationwide, the Daily Telegraph on Christmas Eve likening the impending and first-ever contested election to an essentially two-horse race 'Her Royal Highness . . . riding a charming well-bred filly . . . and Mr Jones (whose) mount has something of the looks of a carthorse and doesn't come from the best of stables'. On 17 February after a postal ballot of the 83,000 strong Convocation, Princess Anne emerged as the clear victor by over 13,000 votes. She is to be installed as Chancellor on 13 October and on the same day has graciously accepted an invitation to visit the College on the occasion of the launching of the College's 150th Anniversary Appeal.

Finances

The financial uncertainties of previous years reached new extremes in 1980–81. The Provisional Grant was announced at the beginning of the Session, which was to be confirmed later. In the event, the Final Grant was not announced until one month after the end of the financial year and showed a reduction

in excess of £300k on the Provisional Grant. Nevertheless, the College was able to conclude the year with income and expenditure reasonably matched. This result was achieved despite the first-year effect of the Government's policy to charge overseas students full economic fees. Inevitably this led to a drop in recruitment of students, but the 10 per cent reduction was far less than at many UK universities and we remain confident that the College is better placed than most to continue to attract students from overseas.

The Grant for 1981–82 announced by the Court shows a cut in resources of a magnitude greater by far than any yet experienced in one year. It represents a shortfall of 15 per cent in the amount needed to maintain the 1980–81 level of activities. It is quite impossible to reduce commitments on a permanent basis to this extent in one year, especially when 78 per cent of College resources is spent on staff emoluments. Whilst we hope to make staff savings approaching £1½m, on the basis of natural wastage and voluntary retirements, this needs to be accompanied by substantial cut-backs in services, support grants and the postponement of building maintenance.

An innovation this year is the change in Government policy for financing Students' Unions. These will no longer operate through the raising of Capitation Fees on student grants – paid for in the main by education authorities. Instead, university income has been increased to bring Union financing within the auspices of general university activity. This presents no serious problems for the College since it is merely a return to the system which operated prior to 1976–77. However, a consequence will be a closer correlation between Union finances and those of academic departments and the College as a whole.

Income in 1980–81 amounted to £41,094,600, an increase of £7,567,364 over 1979–80. Expenditure in 1980–81 was £41,367,586, inclusive of the cost of research borne by Outside Grants which total £8,557,496 compared with £6,593,264 in 1979–80. The number of these Grants was 602 (575 in 1979–80). Capital Grants announced for the year amounted to £90,069 compared to £241,407 for the previous year. Receipts against these and previous Capital Grants and Capital Expenditure amounted to £237,560 compared with £239,935 in 1979–80.

Academic Development

The session 1980–81 brought with it experience of the decision of the Government to charge the full economic fee for overseas students. As indicated in the Report for 1979–80, the College has taken steps to implement an active policy on overseas student recruitment. A campaign was instituted to maintain intake at least at the 1979–80 level, and this campaign has been prompted by the desire to preserve the College as a major international educational institution benefiting from the fruitful interchange of diverse views and differing cultures. The campaign, which began with the preparation and publication for worldwide circulation, of a colourful and attractive brochure entitled the *Overseas Student Guide,* has already met with a measure of success since the College has been able in the session 1980–81 to limit its reduction in overseas student intake to approximately 10 per cent of that of the 1979–80 session, and this against a background of reductions of up to 20–30 per cent in some Universities in other parts of the country. Nevertheless since there is now also a real need to maximise income from overseas student sources the campaign has been further sustained by the setting aside of a sum of £25,000 for recruitment purposes and the formation of a Committee on the Recruitment of Overseas Students to coordinate such action.

The Report for 1979–80 referred to the appointment by the University in March 1980 of a Committee to review Academic Organisation. During the present year the Committee issued two Discussion Documents, the first of which contained a wealth of statistical data against which judgements might be made to meet the shortfall in income of the University then postulated at 15 per cent without taking overseas students into account. The second document went further in that certain ways in which economies might be effected were set down: none specifically related to University College. But the Committee made it clear that its remit, aiming as it did at a review in the medium to long term of the academic structure of the University and its component institutions, did not meet the problems facing the University and the Schools and for which remedies must be sought in a more immediate short-term enquiry. The work of the Committee has however proved useful to the College in providing background information relating to all the major Schools.

Reorganisation of Medical Education in London

Early this year, the Senate and the Court accepted the Report of the Joint Planning Committee on Medical Education in London. To achieve this unanimity, the Deputy Vice-Chancellor had at the last minute introduced a new and hitherto undiscussed proposal: rather than accept the closure of either St Mary's Hospital Medical School or the Middlesex Hospital Medical School, there should be studied and costed the formation of a Joint School by the Middlesex, St Mary's and University College which would incorporate two or more postgraduate institutions, and which would seek to achieve significant cost savings by the closure of one pre-clinical and one clinical School.

Accordingly, a Working Party under the Chairmanship of Sir Richard Way was established to consider this new proposal. The three institutions were represented on the Working Party which also included several independent Senate members.

The Working Party unanimously agreed that to close the pre-clinical department at St Mary's and the clinical department at the Middlesex (or *vice-versa*), and to attach the remains of these Schools to University College, would be impracticable and a disaster in academic terms. It agreed instead to recommend that all three schools remain in being, with an adjustment of student numbers within London to make each School viable. Savings were to be sought by worsening staff/student ratios, pre-clinical to 1:10 and clinical to 1:7. But while St Mary's would remain an entity apart, University College and the Middlesex would form a powerful Joint School, and foresaw great mutual advantage in so doing.

The Joint Medical Advisory Committee has endorsed this recommendation, which goes forward to the Joint Planning Committee, the Court and the Senate.

College Sites and Buildings

It has been a bleak year for new building and improvement projects in the College. Hopes must now be centred on the 150th Anniversary Appeal for the provision of any substantial improvement to our stock of buildings.

Preliminary design schemes have now been prepared for all four projects in the Appeal: the provision of new display and

working areas for the Flinders Petrie Museum and Department of Egyptology on the top floor of Foster Court; the completion of the Gower Street entrance to the College, a drawing of which was hung at this year's Royal Academy Summer Exhibition; the addition of a floor to the Christopher Ingold Laboratories to be equipped for research in organic chemistry; and the construction of a new building for indoor sport and Union accommodation on the site between the Central Collegiate Building and 26 Gordon Square.

All these schemes await the successful outcome to the Appeal, but a start has been made on internal alterations to the Christopher Ingold Laboratories and plans for the additional top floor are in hand. The cost of this project will be met from funds arising from the agreement with Sandoz Products Limited (see page 14).

The work of maintaining the College's stock of buildings continues. The long and difficult repairs to the damaged roof trusses over Wilkins's portico have been completed and the coffers repainted in a glowing colour scheme chosen by Dr Tabor, a member of staff of the Bartlett School of Architecture and Planning.

The College Precinct

The past session has seen a resurgence of interest in the aesthetic state of the College rectangle, stimulated by enlightened and constructive articles appearing in the *Bulletin*.

The Decorations and Gardens Sub-Committee of the Planning and Buildings Committee has done much to improve the College rectangle, not only by obtaining expert advice on the redecoration of the Portico and North and South Cloisters, but also by clearing and planting with shrubs and flowers open areas of the College which have lain untended for several years.

In spite of financial restrictions the Committee will vigorously pursue its task of maintaining for all members of the College an environment which is in keeping with the best traditions of the College.

Staffing Matters

A further stage in the re-organisation of the College administration followed the resignation of Mr C. C. Moore, former Senior

Assistant Secretary (Academic), on his appointment as Secretary of the School of Oriental and African Studies. This resignation allowed all the administrative services relating to registration and to the academic functions of the College to be brought together under the Registrar, a concentration which resulted in a more closely knit structure and achieved an economy in staffing. Further changes have also taken place in the General Division making possible a complete redistribution of the functions previously carried out by the Establishments Office, Mr R. F. F. Hill and Mr M. C. Maltby becoming responsible for the Services Department and Student Residence Office respectively.

The introduction of computerised facilities for registration procedures has continued although more slowly than expected because of difficulties in the University in maintaining progress on the development programme.

This year has demonstrated how the work of the Personnel Department is increasingly influenced by external factors. Government policy on public service pay reduced the number of pay revisions in sharp contrast to the previous year when national negotiations were influenced by the Clegg Commission. The UGC announcements during the summer of 1981 on the future levels of university funding make the process of filling posts more complicated as Departments seek to make the required economies. The reduction in the number of posts which the College is trying to fill coincides with high national unemployment. Where posts are advertised it is now relatively easy to find suitable applicants and the frustrations of, for example, secretarial recruitment have now been at least temporarily overcome. This year has also seen considerable advances in the training of administrative and clerical staff. The Personnel Department has organised a training programme covering such subjects as committees, interviewing and the role of administrators.

Student Numbers

On 31 December 1980, 6,761 students (including those in the Faculty of Clinical Sciences) were registered at the College. Of these, 4,874 were full-time undergraduates, of whom 1,595 were newly admitted to first degree courses.

The total postgraduate student population as at 31 December 1980 was 1,773. Of these, 1,249 were studying on a full-time basis and 524 part-time. Of the full-time postgraduates 57 per cent were undertaking research. Of the part-time postgraduate students 61 per cent were undertaking research.

The College has continued to attract students from many overseas countries. There were 592 full-time students from 34 Commonwealth countries and 471 from countries other than the Commonwealth. Of these students from overseas, 279 were studying on a full-time basis at postgraduate level.

The number of full-time students who paid the overseas higher rate of fee was 826 as at 31 December, 1980, 13.5 per cent of the total College full-time student population. In 1980–81 students from EEC countries were excluded from this category.

Of the full-time undergraduate students in attendance at the College, 1,950 were living in Halls of Residence or other accommodation provided by the College or the University; the remainder were in lodgings or flats, or living at home.

The College Appeal

The 150th Anniversary Appeal is to be officially launched by the Provost on 13 October 1981 in the presence of HRH the Princess Anne, Mrs Mark Phillips, who will earlier that day be installed as Chancellor of the University. Our target is £4 million and we have attracted over £500,000. There are four major projects. One is to extend the Engineering and Galton buildings on either side of the Front Lodges, 'to complete the Gower Street gap' in accordance with the admirable design by Sir Hugh Casson. These extensions will provide much needed additional space for Computer Science and Engineering, both subjects of great national importance. A second is to re-house our famous Flinders Petrie Egyptology Collection, a pressing need in that it is still accommodated in what used to be a stable. A third is to provide adequate sports and recreational facilities for our students and staff in a new building on Gordon Street. A fourth is to complete our Chemistry building by the addition of a new floor.

In the present economic climate there is no hope of public funding for these desperately needed improvements, so it is of the utmost importance that our Appeal succeeds.

Professor D. W. James has taken over as Appeal Director, and will be grateful for suggestions for its advancement.

Academic Matters

In the year preceding this Report a Centre for Neuroscience was set up in the College with Professor Burnstock as its Convener and Dr Saunders as Deputy Convener. The main aim of the Centre is to facilitate active communication between the many scientists with strong interests in different aspects of neuroscience from the Faculties of Science, Medical Sciences and the Faculty of Clinical Sciences (formerly University College Hospital Medical School). Membership is drawn from staff working in a wide spectrum of fields, including neuroanatomy, neurochemistry, neurophysiology, neuropharmacology, neuroendocrinology, neuropsychology, neurology, psychiatry, neuropathology, developmental biology, obstetrics, surgery, paediatrics and anaesthetics. Since the establishment of the Centre a wide range of activities has been organised: regular seminars have been given throughout the academic terms; workshops for both pre-clinical and clinical scientists; an International Meeting on Muscular Dystrophy and a European Molecular Biology Organisation Course on 'Culture of Nerve Cells'. The Monthly News Sheet, which had an initial circulation of about 100, is now sent to over 400 neuroscientists. Formal affiliations with Centres for Neuroscience in Europe, Australia, U.S.A. and Israel are being considered. The beginnings of a library collection is housed in the Centre's rooms in the Faculty of Clinical Sciences. The College has now agreed to make a contribution of £5,000 per annum towards the running of the Centre and smaller sums have been donated by several outside bodies. Plans are in hand to extend the activities of the Centre during the 1981–82 session with further regular meetings covering a wide variety of neuroscientific fields.

During the last eight years the Department of Medical Physics has attracted considerable funding from industry to support collaborative research and development. The major focus of this work has been the development of devices for monitoring the critically ill, in particular invasive and non-invasive devices for blood-gas measurement. As a result of successful collaboration with industry, a number of devices have been developed by the

Department which industry has naturally been keen to exploit. The outcome has been the establishment of a Medical Instrumentation Unit to continue collaborative development projects and to undertake pre-production prototype development work, the principal objective being to assist in the rapid transfer of new instrumentation technology to the manufacturers of medical instruments. The Unit will be supported by the Academic Services Unit on a self-financing basis.

During the session four new undergraduate courses have been introduced: the BA degree, the Ancient World, taught in the Departments of Latin, Greek, Ancient History and Classical Archaeology; BA degrees in Ancient History and Egyptology, and in English and German; and the BSc degree in the field of Genetics. Admissions to the BSc (Econ) degree in Economics and Social Anthropology and the BA degree in Norwegian and Icelandic have been discontinued. At postgraduate level two new Masters degrees have been introduced: the MSc in Urban Development Planning; and the MSc in Biological Anthropology.

Academic Services Unit

The Academic Services Unit of the College has now completed its first two years of full-time operation. The number and range of Research and Development and consultancy projects has increased substantially during the last year. The Unit has assisted departments and staff to plan consultancy arrangements and to negotiate funding for multi-disciplinary research and development work. It has assisted in the exploitation of intellectual property particularly in the area of advanced instrumentation. The Unit has also assisted with the design, costing, organisation and publicity of short courses for mid-career personnel, overseas students and others.

The Library

At the beginning of the first term a committee under the chairmanship of Professor Peter Rowe was set up to review the operation of the formula method of financing and to investigate the total resource allocation to the Library. The committee reported in April and its recommendations have been approved by the Academic Board.

Plans to introduce automation have been endorsed by the committee and the Library expects to join the University of London Shared Cataloguing Scheme in the session 1981–82 as the first stage of a two part programme to automate cataloguing and issue methods.

Public Lectures

The following public lectures were among those arranged by the College during the session: Banister Fletcher Lectures by Sir John Summerson (Curator, Sir John Soane Museum) on 'The Historical, the Modern and Sir John Soane' (2 lectures); Commonwealth Fund Lecture by Professor Allen Weinstein (Smith College, Mass.) on 'Beyond McCarthyism: American Society and the Internal Security Issue, 1917–1960'; Current Legal Problems Lectures by (i) Mr M. D. A. Freeman on 'The Jury on Trial', (ii) Professor Paul Jackson (University of Reading) on 'Easements by Implication and Necessity', (iii) Professor A. W. Bradley (University of Edinburgh) on 'Administrative Justice and the Binding Effect of Official Acts', (iv) Dr F. Parkinson on 'The United Nations Integrated Commodities Programme', (v) Mr Paul Matthews on 'Proprietary Claims at Common Law for Mixed and Improved Goods', (vi) Mr Christopher McCrudden (University of Oxford) on 'Legal Remedies for Discrimination in Employment', (vii) Mr Jeffrey Hackney (University of Oxford) on 'The Politics of the Judiciary II'; Freud Memorial Lectures in Psychoanalysis by (i) Dr J. Bowlby (Tavistock Clinic) on 'Psychoanalysis as a Natural Science', (ii) Professor Christopher Lasch (University of Rochester, New York) on 'The Freudian Left and the Theory of Cultural Revolution'; 'The Transition from Patriarchal Authority to Bureaucratic Authority in Western Europe and America' (5 lectures), (iii) Professor Karl H. Pribram (Stanford University) on 'The Concept of Energy in Psychology – Late 19th and Late 20th Century Views', 'The Organisation of Selfhood: Memory – Motive and Ego Processing', 'The Conscious – Unconscious Distinction Reconsidered', 'A Century of Observations of the Brain Mechanisms of Thought and Language' (4 lectures); A Commemorative Lecture by Mr Negley Harte on 'One Hundred and Fifty Years of History Teaching at University College London'; Neale Lecture in English History by Christopher Hill (Open University) on 'Parliament and People

in Early 17th Century England'; Lord Northcliffe Lectures in Literature by Mr Gabriel Josipovici (University of Sussex) on 'Writing and the Body' (4 lectures); Rickman Godlee Lecture by Professor Bernard Williams (University of Cambridge) on 'Legislating About Pornography'; Shearman Lectures by Professor Amartya Sen (University of Oxford) on 'Liberty, Needs and Rights' (3 lectures); Smeed Memorial Lecture by Mr David Bayliss (GLC) on 'A Billion New City-Dwellers – How Will They Travel?'; Smith, Kline and French Laboratories Lecture in the Allied Health Sciences by Dr K. Krnjević (McGill University) on 'Mechanisms of Facilitation in the Hippocampus'; William Townsend Lecture by Mr Reg Butler on 'The Venus of Lespugue and Other Naked Ladies'.

Inaugural Lectures were given by Professor M. Ruth Bellairs (Embryology) on 'Cell Invasiveness as an Embryonic Process', Professor A. Boyde (Dental Anatomy) on 'The Borderland Between Electron Microscopical Technique and Understanding the Structure and Function of the Mineralized Tissues', Professor A. J. Strathern (Anthropology) on 'Fieldwork and Theory in Social Anthropology', Professor R. M. Maxwell (Architecture) on 'The Two Theories of Architecture', Professor D. Bishop (London Master Builders Professor of Building) on '. . . if he build what is good', Professor G. Manners (Geography) on 'Regional Policies and the National Interest', Professor F. G. B. Millar (Ancient History) on 'The World of the *Golden Ass*', Professor A. J. Fourcin (Experimental Phonetics) on 'A Word in Your Ear', Professor T. C. Griffith (Physics) on 'Experiments with Anti-Electrons', Professor A. Boksenberg (Physics) on 'To the Edge of the Universe', Professor T. J. Biscoe (Jodrell Professor of Physiology) on 'The Best Laid Schemes . . .'.

In the International Year of the Disabled it was appropriate that Group Captain Leonard Cheshire, V.C. was invited to deliver the eighty-fifth Foundation Oration. His subject was 'The Meaning of Disability' with reference both to developed countries and to the Third World, and the Oration was delivered in the Collegiate Theatre on 9 March 1981.

University of London Computer Centre at UCL

The fourth computer making up the linked GEC system, EUCLID, was delivered to the Computer Centre in August 1980 and all

the other equipment that had been on order was also delivered during the session. There has been considerable concern that the capacity of the total system as installed fell far short of expectations: this has led to a joint effort with the company to seek ways of bettering performance and it appears that major improvements will be installed before the session 1981–82. A special grant from the Computer Board for Universities and Research Councils was received for the establishment of a Microprocessor Support Laboratory, to assist researchers in the College, complementing similar UGC grants for teaching microprocessor techniques. The new committee structure for the College's computing facilities, as referred to in the Annual Report for 1979–80, came into being with Professor F. F. Heymann and Dr D. C. Cusworth as the respective Chairmen of the Computer Management Committee and Computer Users Committee.

Health, Safety and Welfare

The Joint Consultative Committee was established in 1979 as a forum for discussion between management and the unions recognised in the College on health, safety and welfare matters. A recent amendment to the constitution has allowed the Union of Construction and Allied Trades and Technicians to be represented on the Committee following recognition of that union for certain staff in the Maintenance Department.

In the International Year of the Disabled the College's enthusiasm for action to make the premises more suitable for the needs of the disabled person, has been much tempered by the severe constraints of ways and means. Nevertheless, within those severe constrictions some progress has been apparent. Plans have been approved and work has been commenced on the conversion of toilet facilities on the ground floor of the South Junction, and it is hoped in due course to begin construction of a wheelchair ramp to the North Cloisters from the front quadrangle.

The Committee on Disabled Persons is engaged in a careful appraisal of the difficulties presented by the buildings and their situation, and when complete this should identify the most urgent needs. The solution of the difficulties will, ultimately, depend on the finances available for the necessary alterations to buildings. At this stage, the Committee must proceed with

guarded optimism. In October 1981 Mr John McN. Dodgson, Department of English, becomes Chairman of the Committee. He succeeds Professor K. J. Ives to whom the Committee expresses grateful thanks for his pioneer efforts.

College Collections – Strang Print Room

The work on the conversion and fitting out of the Strang Print Room was completed during the Easter vacation of 1981. The staff were delighted to welcome many of those who had contributed so generously to the New Print Room Appeal at the opening ceremony on 21 May, and to the first exhibition, '*Men and Memories*' illustrating some recollections of William Rothenstein.

The Strang Print Room is open to visitors from 1pm to 3.50pm on weekdays during term. Members of staff, accompanied guests and students of the College wishing to see works exhibited or to obtain information about the Collections are welcome during the lunch hour between 1pm–2pm. Visitors wishing to study the Collections are asked to make an appointment from 2pm onward.

Jeremy Bentham

During the Summer Jeremy Bentham spent part of the vacation undergoing remedial conservation of his clothing at the Textile Conservation Centre.

He has now returned spick and span, ready for viewing by his many visitors, and sits within the confines of a freshly sealed and spring-cleaned cabinet.

Schools Conference

Representatives of seventy-one schools in England and Wales attended the fifteenth annual Schools Conference which was held on 2–3 April 1981.

Following an introduction and welcome to the College by the Provost, guests were entertained to talks on 'The Machiavellian Humanities' by Professor John Hale, and on 'Benefits and Risks of Modern Medicines' by Professor Desmond Laurence. The teachers then divided into small groups, visiting between them a total of thirty-two College Departments of their choice for discussion on academic matters with Admissions Tutors and

other staff. The session on Student Activities provided a valuable opportunity for teachers to learn about such other matters as student accommodation, welfare services and careers opportunities.

As in previous years schools representatives stayed in Ramsay Hall and were therefore able to experience at first hand the excellence of the College's student residential facilities.

Once again the most successful feature of the Conference was felt to be the opportunity for school participants to meet, both formally and socially, a broad range of members of academic staff. The friendly and informative way in which the visitors were received by College staff was particularly stressed in many of the letters of appreciation which were subsequently received.

Association of Friends of University College London

During 1980–81 the Friends of University College awarded grants in support of the following projects: creation of a new garden at Shenley Sports Ground, to be known as the 'Tattersall Garden' in honour of Mr A. Tattersall's long and faithful service to the College (£1,050); provision of two garden seats as part of a memorial to Mr A. J. L. Cahill (£215); contribution towards production costs for 'Herodiade' by the Opera Society (£225); provision of tour jumpers and ties for the Rugby Club (£300); purchase of a piano for Campbell House (£350); establishment of a 'contingencies fund' for the College Eclipse '81 Expedition to Siberia (£250); assistance to the Boat Club for the purchase of a new 'coxless pair' craft (£1,000); and renovation of the Cirkusact Room in the Central Collegiate Building (£1,150). In addition, the Friends contributed a further £1,000 towards the cost of completing the fittings for the Strang Print Room, and gave £5,000 towards the refurbishment of the Upper Hall (Refectory).

Since their foundation in 1952, the Friends have made grants to College and to the Union totalling more than £84,000. The Friends continue to be asked for help to provide facilities that contribute so much to the quality of life in the College for staff and students, particularly in these times of financial stringency. If they are to continue to assist in this manner and to this extent, it is vital that both the levels of membership and of subscriptions and donations be increased.

HONOURS AND DISTINCTIONS

In February 1981 Her Majesty the Queen was pleased to bestow the Order of Merit on Sir Peter Medawar, Jodrell Professor of Zoology and Comparative Anatomy 1951–62, and Honorary Fellow of the College. In the New Year Honours in 1981 Dr J. W. Black, Professor of Pharmacology 1973–78, and Emeritus Professor E. G. Turner, Professor of Papyrology 1950–78, Honorary Fellow of the College, were created Knights Bachelor. The following former students received the C.B.E. – R. A. Eden (Geology) lately Assistant Director, Scotland, Institute of Geological Sciences; V. I. Webber (Laws) for services to British commercial interests in Zambia. Former students receiving the O.B.E. were: D. J. B. Copp (History and Philosophy of Science) General Secretary, Institute of Biology, and I. A. Crawley (Librarianship) Chief Librarian, Belfast Library and Education Board.

In the Queen's Birthday Honours Rabbi Immanuel Jakobovits, Chief Rabbi of the British Commonwealth, and a former student (English, German, Greek, Hebrew) was created a Knight Bachelor. The C.B.E. was conferred on Professor A. N. Exton-Smith, Barlow Professor of Geriatric Medicine, and on the following former students: Dr A. W. C. Taylor (Chemistry) Chairman, North East Industrial Development Board, Fellow of the College, and Professor B. E. Tomlinson (Medical Sciences) Consultant Neuropathologist, General Hospital, Newcastle upon Tyne.

The title of Honorary Fellow was conferred in 1981 on Sir Andrew Huxley, Professor of Physiology and Royal Society Research Professor, University College London; and on Sir Francis Sandilands, Treasurer, University College London, Chairman, Commercial Union Assurance.

The following were elected Fellows of the College in 1981: Alec Douglas Bangham, Senior Principal Scientific Officer, Agricultural Research Council's Institute of Animal Physiology, Babraham, Cambridge; Peter Nelson Campbell, Director of the Courtauld Institute and Courtauld Professor of Biochemistry, The Middlesex Hospital Medical School, London; Naomi Datta, Professor of Microbial Genetics, Royal Postgraduate Medical School, London; Robert James Fisher, Sub-Dean, Faculty of Environmental Studies, Senior Lecturer and Tutor, Bartlett School of Architecture and Planning; Leonard George Goodwin, Director of Science, The Zoological Society of London; Akin L. Mabogunje, President of the Nigerian Geographical Association, President of the International Geographical Union; Jonathan Wolfe Miller, Film director and producer, British Broadcasting Association; John William Mullin, Professor of Chemical Engineering and Vice-Provost, University College London; The Rt Hon Lord Perry of Walton, Vice-Chancellor, Open University; The Hon Sir Harry Woolf, Judge of the High Court of Justice, Queen's Bench Division.

Interesting and important appointments announced during the session included those of Professor A. Boksenberg as Director of the Royal Greenwich Observatory from 1 October 1981, Professor J. L. Jowell as Chairman

of the Social Sciences and Law Committee of the Social Science Research Council, and Mr I. H. Dennis as a member of the project, undertaken by the Society of Public Teachers of Law under the aegis of the Law Commission, to make proposals for a code of criminal law for England and Wales. Professor J. R. Hale was appointed Public Orator of the University of London from 1 August 1981, and Professor J. W. Mullin was elected Dean of the University of London Faculty of Engineering. Professor Eleanor M. Burbidge, a former student (Astronomy) and Fellow of the College, was appointed President elect of the American Association for the Advancement of Science; and another former student, Mr P. H. Halsey (Mathematics), was appointed to the Headship of the Teaching Branch of the Department of Education and Science.

Elections to academies and learned societies included the election of Professor Sir Andrew Huxley as President of the Royal Society, and Professor Patricia H. Clarke to its Council. Professor M. A. Screech was elected a Fellow of the British Academy, and a former member of staff, Dr D. M. Wilson, was similarly honoured, whilst Sir Peter Medawar was elected an Honorary Fellow. Professor P. N. Rowe was elected to the Fellowship of Engineering. Professor Sir Andrew Huxley was elected an Honorary Member of the Royal Institution of Great Britain. Professor B. Cheng was elected a Fellow of the Royal Aeronautical Society. Within the University Professor R. A. Humphreys was elected an Honorary Fellow of the School of Oriental and African Studies. A former student of Geography, and recently elected Fellow, Professor A. Mabogunje, was elected to the office of President, International Geographical Union, 1980–84. Emeritus Professor A. D. Momigliano was elected a Foreign Member of the Institut de France (Academie des Inscriptions et Belles Lettres).

Honorary Degrees were conferred on Members of the College as follows: the D.Litt. of the Heriot-Watt University on Professor L. Gowing, the D.Sc. of the University of Leeds on Sir Dennis Rooke, and the D.Sc. of the University of East Anglia on Professor K. Stewartson. Emeritus Professor A. D. Momigliano received the D.Litt. honoris causa of the University of Urbino (1978), Doctorate in Humane Letters of the Hebrew Union College of Cincinnati (1980), and the D.Phil. honoris causa of Tel Aviv University (1981).

Other notable honours included the award to Sir James Lighthill of the 1981 Harvey Prize for Science and Technology for his work as an applied mathematician. Professor J. P. Stern received a Humboldt Award of the Alexander von Humboldt Foundation, while Professor N. F. Watson received an award of excellence from the American Illuminating Engineering Society for work in connection with the Tate Gallery Extension. Emeritus Professor G. C. Allen received an award from the Japan Foundation in recognition of studies of the Japanese economy, and Emeritus Professor A. D. Momigliano was awarded the Kenyon Medal by the British Academy for work in classical scholarship. A postgraduate student, J. R. G. Harrop (Photogrammetry and Surveying), was awarded the Order of Tri Shakti Patta (4th class) by the King of Nepal. Mr I. W. G. Martin, Assistant Librarian was elected a member of the British National Committee of the International Byzantine Association. The late Dr A. J. Arkell was awarded

the Order of Sciences, Arts and Art of the Golden Class by the President of the Democratic Republic of the Sudan.

APPOINTMENTS

The session brought a number of changes in Headships of Departments. Professor E. A. Ash succeeded Professor A. L. Cullen as Pender Professor of Electrical Engineering and Head of the Department of Electronic and Electrical Engineering. Professor J. Musgrove, Haden-Pilkington Professor of Environmental Design and Engineering, succeeded Professor A. D. G. Smart as Head of the Bartlett School of Architecture and Planning. Professor Elizabeth B. Robson assumed the sole Headship of the Department of Genetics and Biometry on the transfer of Professor R. J. Berry to the Department of Zoology and Comparative Anatomy.

Mr W. J. Corlett was appointed Acting Head of the Department of Political Economy for this session, while Dr J. L. Watling became Acting Head of the Department of Philosophy for the second and third terms.

Dr Lisanne Bainbridge, lecturer in Psychology at the University of Reading, was appointed to a Readership in Psychology.

The following became Professors by conferment of title: Dr M. Ruth Bellairs (Embryology); Dr A. Boyde (Dental Anatomy); Dr T. C. Griffith (Physics); Mr G. Manners (Geography) while the following Readerships were conferred: Dr Barbara E. C. Banks (Chemical Physiology), Dr N. F. Dixon (Experimental Psychology), Dr W. R. Eatock-Taylor (Ocean Engineering), Mr M. D. A. Freeman (English Law), Dr G. Gabella (Cytology), Dr J. Gregory (Water Chemistry), Dr I. R. Johnston (Biochemistry), Mr R. J. Loewe (Hebrew), Dr B. R. C. Martin (Physics), Dr G. T. Martin (Egyptian Archaeology), Dr S. A. F. Murrell (Geophysical Mechanics), Dr R. J. Rowbury (Microbiology), and, from 1 January 1981, Dr E. J. W. Jones (Geology).

The following Visiting Professors were appointed during the session: Professor H. Bekker-Nielsen, Odense University, (Scandinavian Studies), Dr J. Bowlby, Tavistock Institute of Human Relations, (Freud Memorial Visiting Professor in Psychoanalysis), Dr H. A. French, Admiralty Surface Weapons Establishment Cosham, (Electronic and Electrical Engineering), Professor G. H. Gellie, University of Melbourne, (Greek), Professor M. Glickstein, Brown University, (Anatomy), Professor A. Y. Hassan, Director of the Institute for the History of Arabic Science at Aleppo University, (History and Philosophy of Science), Mr P. A. B. Hughes, Managing Director and Chairman of Logica Limited, (Computer Science), Professor C. Lasch, Rochester University, (Freud Memorial Visiting Professor in Psychoanalysis), Dr R. J. Mainstone, part-time consultant to UNESCO and author (Architecture and Planning), Sir John Summerson, Curator of Sir John Soane's Museum, (Banister Fletcher Visiting Lectureship in Architecture).

There was a number of changes in College Faculty appointments as follows: Professor D. Bishop became Dean of the Faculty of Environmental Studies, and Professors M. W. Swales, E. A. Ash, J. Musgrove and G. Burnstock became Vice-Deans of the Faculties of Arts, Engineering, Environmental Studies and Medical Sciences respectively. Mr S. F. D. Guest was appointed Sub-Dean of the Faculty of Laws.

During the year there were appointments and special lectureships as follows: Dr R. D. H. Boyd was appointed to the Chair of Paediatrics and Child Health at the University of Manchester. Professor Valerie Pearl was elected by the Worshipful Company of Barber-Surgeons to deliver the 1981 Sir Lionel Denny lecture, and Dr G. E. Hunt was appointed Rouse Ball Lecturer at the University of Cambridge, 1981, to deliver the Scott Lectures. Emeritus Professor A. D. Momigliano delivered the University of London Creighton Lecture in February 1981. His Alexander White Professorship in the University of Chicago was extended to 1984, and the Grinfield Lectureship on the Septuagint at Oxford to 1982.

RETIREMENTS

Professor Allan Maccoll, who retired in September 1981, came to University College in 1945 from Sydney University where he had been a senior lecturer. He came as an ICI Fellow bringing an interest in gas phase kinetics to a chemistry department where Ingold had established a strong school in solution kinetics. He was appointed to the staff in 1947, became a Reader in 1953 and Professor of Chemistry in 1963. His systematic and wide-ranging investigation of gas-phase elimination reactions led to a major generalisation about the nature of the transition state of elimination reactions. At the same time it opened up the way for a unified treatment of reactions in the gas phase and in solution. His interests in gas phase molecular decomposition took him into mass spectrometry. In 1968 he was appointed foundation Editor-in-Chief of the Journal *Organic Mass Spectrometry*. His wide scientific interests also led to publications on vibrational spectroscopy and quantum mechanics, including a much cited paper on overlap of hybrid orbitals. Few people can have made a greater contribution to College life than Professor Maccoll. He has served on the major committees of the College and the University, and is well known for his work on many other committees including those associated with the Library, the Common Room (as it was), the A.U.T., and car parking. He is very much a University College man and was made a Fellow of the College in 1977. As Professor Emeritus with a room in the Chemistry Department we can expect to see him frequently about the College and continue to enjoy his wise counsel on many matters, scientific, College, and personal.

Professor W. R. Mead was appointed Lecturer in Geography in October 1949 but arrived one year later, after spending a year on a Leverhulme Fellowship in Finland; by no means his first visit and certainly not his last. For thirty-one years he graced the College not only through his scholarship but especially by his unfailing kindness in a myriad undemonstrative ways. He rose through the ranks to become head of the department in 1966 and ran that large and complex body with flair and distinction through a period when Geography became first more numerate then more applied. Whilst encouraging new developments, he maintained a firm belief in the efficacy of literacy and maintained a balanced view of the subject through what have been revolutionary times. His periods of office as Chairman of both Student Accommodation and Pension and Superannuation Committees were memorable for his gentle and persuasive manner and his penchant for playing host at numerous working lunches. He was a long-

standing tenant of the basement flat in Hornton Street where he entertained a never-ending stream of friends with his culinary arts. Scandinavian studies benefited from his research interest in Northern Europe, which also spilled over into the School of Slavonic and East European Studies, on whose Council he has served for many years. Bill Mead's talents had many other foci outside the College — the Anglo-Finnish Society and the Royal Geographical Society in particular owe much to his powers of organisation and enthusiasm. He will doubtless continue to follow his musical circuit, from Covent Garden and the Coliseum to the Albert Hall and Glyndebourne, after his retirement to the relative peace of the Vale of Aylesbury.

Professor E. J. Ross, who retired in September 1981, has associations with the College stretching back to 1936, first as a student and later as a member of staff at University College Hospital Medical School. He obtained a BSc in Physiology in 1939. There then followed a period of war service, and he did not return to the College until 1946 when he then held a part-time Research Assistantship in Physiology while working at the Medical School for his medical degree which he obtained in 1951. He joined the Medical Unit at the Medical School as a Junior Lecturer in 1953, became a Lecturer in 1954, Senior Lecturer in 1959, Reader in Medicine in 1967 and Professor of Endocrinology in 1973. He was appointed an Honorary Consultant Physician at University College Hospital in 1960. Professor Ross is a Fellow of the Royal College of Physicians and a Fellow of the Royal Society of Medicine.

Dr P. E. Hughesdon, who gained his medical degree at University College Hospital Medical School in 1942, first worked as a Pathology trainee in the Department of Morbid Anatomy, under Sir Roy Cameron, from 1946–48. He became a Lecturer and Gynaecological Pathologist in 1948, a Senior Lecturer in 1959 and Reader in Gynaecological Pathology in 1973. Dr Hughesdon was appointed as Honorary Consultant at University College Hospital in 1965. Dr Hughesdon has been invited and has agreed to remain as a part-time Senior Lecturer in the Department after his retirement in September 1981, pending the filling of the Department's Chair.

Dr J. T. Pring was appointed to the staff of the Department of Phonetics in 1944, being one of the small but heroic group whose task was to restore a disintegrated Department to its pre-war strength. The College was fortunate to obtain the services of a man of such scholarly distinction, with a specialty in Modern Greek for which he wrote a widely-used grammar. Throughout his thirty-seven years in the Department, he had a heavy teaching load, including the phonetics of English, French and Italian as well as Modern Greek. At the same time, he was working on his Modern Greek-English dictionaries, now published by the Clarendon Press. His well-deserved promotion to Reader took place in 1964. He is one of the last remaining links with the regime of Daniel Jones, whose practical views he endorsed. At a time when much linguistic writing seemed to him arid, he strove to revive an interest in the aesthetic values of spoken language. Unmoved by fashionable, but ephemeral, attitudes in the subject, he is a literate and elegant scholar who has always been a loyal and helpful colleague.

Maurice Brown, who retired in 1981, was appointed Senior Lecturer in

Planning in 1963. He had previously worked as a planner in the Department of Health for Scotland and was then appointed Assistant Chief Architect (Planning) to the East Kilbride Development Corporation. Between 1952 and 1963 he was responsible for Planning Education at the Regent Street Polytechnic. He will be long remembered as a dedicated teacher and supervisor by numerous former students, over one hundred of whom attended a party in College to mark his retirement.

Dr Amelia Banks, who retired in September 1981, served in many capacities within the College and was also a student here before the War. She joined the Faculty of Engineering as a Confidential Clerk in 1945, being Faculty Clerk from 1946–50. During the same period she obtained a BA in Sociology. In 1950 she joined the Psychology Department as a Senior Confidential Clerk and later became Departmental Assistant. She obtained her PhD for research in the field of animal psychopharmacology in 1957. In 1972 she was appointed a Lecturer in the Department and up to her retirement was Postgraduate Advisor. The expertise she gained in this post made her a valuable member of the Higher Degrees Sub-Committee of the University Board of Studies in Psychology of which she was at one time Chairman. She was active in College affairs, especially in connection with the Common Rooms and the Inter-Faculty Dining Club. Her lively interest in Classics and Archaeology means that she will be here once more in the role of a student and will continue to be seen by her many friends.

Dr Peggie Hobson came to University College in 1966 as Warden of Campbell Hall, the Women's Hall of Residence, and Lecturer in Geography. She remained as Warden, making a vital contribution to student welfare, until the end of 1972, when Campbell Hall, like other halls before it, became mixed. She continued her research and teaching on the geography of Africa, with special reference to settlement studies, and developed her subsidiary interest in the plant geography of southern Africa. She became a well-known member of the College community through her residence first in Campbell Hall and then in Hornton Street.

1981 marked the retirement of a number of long-serving members of the administrative staff of the College. Jack Rice and Harry Attree retired on 31 July 1981 having served a total of 55 years in the Finance Division. Jack joined the College in October 1948 and Harry in July 1956 and they spent the majority of their joint service in the Research Grants Section of the Division. Their experience will be greatly missed.

Roger Mortimer, Assistant Librarian, retired after nearly 33 years service. Starting as a cataloguer in 1948 he became the subject specialist in a number of Arts subjects.

Another long-serving member of the administrative staff Mr Ron Blackaby first joined the College in 1947 following military service in the RAOC. During the subsequent period of time at College his activities, which progressively enlarged with time, centred around the Establishment Office for which he was made responsible as Establishment Officer in 1962 and then as Assistant Secretary – Services and Establishments in 1969. In 1978 the Establishment Office became a part of the General Administration Division and his wide management experience made him an obvious choice to become Deputy Head of the Division. His efforts for the College in

particular in the student accommodation area were widely appreciated and although he is now entering retirement, he will retain a connection with the College as Manager of Goldsmid House for the coming year.

RESIGNATIONS

Professor R. E. D. Bishop, CBE, FEng, FRS, resigned from the Kennedy Chair of Mechanical Engineering in September 1981 in order to take up the appointment of Vice-Chancellor of Brunel University. During his twenty years as Head of the Department of Mechanical Engineering he guided the Department through many changes before becoming a Research Professor in 1977. The most far-reaching change brought about during Professor Bishop's twenty years of headship was the agreement reached in 1967 whereby the Department became responsible for the education of all entrants to the Royal Corps of Naval Constructors. From this sprang the Department's deep involvement in Ocean and Marine Engineering as well as Naval Architecture. After his wartime service in the RNVR Professor Bishop graduated from University College in 1949 with first class honours whence he carried out research under Professors S. P. Timoshenko and J. N. Goodier at Stanford University. After a year as a Senior Scientific Officer at the Ministry of Supply he went to the University of Cambridge for five years before joining the College in 1957. His academic achievements are illustrated by a lengthy list of publications. His several books on Vibration have been translated into German, Polish, Russian, Czech, Arabic and Japanese. A book on ship dynamics has been translated into Chinese and another on the hydroelasticity of ships into Japanese. Professor Bishop's work has been additionally acknowledged by the award of many prizes and medals and invitations to give designated lectures. In 1980 he was invited to China by the First and Sixth Ministries of the Peoples' Republic, as a visiting lecturer. Through his work and consultancy Professor Bishop has established close connections with industry covering a wide spectrum of activity. In particular he has been concerned with heavy industry and the problems which can give rise to major accidents. He is one of a very small number of 'heavy' engineers who have become Fellows of the Royal Society.

In August of this year, Professor R. K. Burcher, BSc, PhD, FRINA, left the Department of Mechanical Engineering to take up the appointment of superintendent of the Admiralty Marine Technology Establishment (formerly A.E.W.) at Haslar. Professor Burcher was third in a line of distinguished Naval Architects who are seconded to the College by the M.O.D.(N) as the result of the agreement concerning the education of members of the Royal Corps of Naval Constructors. Like his predecessors Professor Burcher brought to the College up-to-date knowledge and experience of design and construction methods in Naval Architecture and Marine Technology. This regular injection of current experience ensures that the department's MSc courses in Naval Architecture and Marine Engineering are always topical, particularly (and perhaps uniquely) with respect to their design component. During his four years as Professor of Naval Architecture, he has investigated the stability of vessels in a sea-way and has shown that an instability resulting in capsize can occur when a ship is proceeding head-on into a series of waves. This is both a surprising

and alarming result, as ships normally turn head-on into the sea if excessive rolling is encountered, and may account for some hitherto unexplained losses in recent years.

Professor Valerie Pearl resigned in September 1981 as Professor of the History of London to take up the post of President at New Hall, Cambridge. She came to the College in 1968 from Somerville College, Oxford, where she had been Lecturer in Modern History and Rose Graham Research Fellow. Already an authority on London history, in 1975 she launched the now deservedly famous *London Journal*. A sequel is now eagerly awaited to her widely acclaimed book, *London and the Outbreak of the Puritan Revolution* (1961); it is provisionally entitled *London and the Puritan Revolution, 1642–1660*. During her time at University College she served as Literary Director of the Royal Historical Society and as President of the London and Middlesex Archaeological Society. Her departure is particularly sad given that the College has not currently been able to appoint a successor.

Professor Randolph Quirk, CBE, MA, PhD, DLit, FBA, Foreign Fellow of the Royal Belgian Academy of Sciences, Honorary Doctor of the Universities of Lund, Uppsala and Paris, etc., alumnus and Fellow of University College, has vacated the Quain Chair of English Language and Literature, to which he was translated in 1968 from the Professorship of English Language which he had assumed in 1960 on his return from the University of Durham, to become Vice-Chancellor of the University of London. His friends and colleagues in the Department of English and the College hope that his incumbency in that onerous and arduous office may be attended by the same success and felicitation as graced his work here, where he has been remarkable for great learning, lucid teaching and unfailing industry, and for his intelligent zeal in the affairs of College and University. He has earned and deserved great honour as the acknowledged world authority on Modern English Usage. Let us wish him equal success in the ways of high academic administration. It is comforting to observe that (despite the enormous demands of his new appointment) his boundless energy permits him to keep up an active participation in his world-famous *Survey of English Usage* in the Department of English. So we shall not altogether lose him, after all; and although he now becomes 'one of them at Senate House' he will remain recogniseably one of us.

Dr Peter Clarke resigned in October 1980 as Reader in Modern History to go to Cambridge as Lecturer in Modern History and Fellow of St John's College. He came to University College in 1965, which was his first appointment, and rapidly established an increasingly formidable reputation as an historian of Liberalism. In 1971 appeared his *Lancashire and the New Liberalism*, to be followed in 1978 by *Liberals and Social Democrats*. He also played a major role during the early 1970s in reforming the University of London History syllabus, and will be remembered in College as a particularly successful Departmental Tutor. He is a great loss to University College.

RETIREMENTS FROM COUNCIL

The College was sorry to learn of the retirement of Mr S. W. C. (Bill) Phillips as a member of Council. Bill first became associated with the College in 1927 when he joined as an undergraduate in the History Department. He was awarded the Derby Scholarship in 1929 and graduated with an Upper Second Class Honours Degree in 1930. He was President of the Union Society 1931–32, Bursar and Sub-Warden of University College Hall Ealing in 1932 and between 1932–41 he was on the administrative staff of the Universities of Hull and Liverpool before moving into the Civil Service where he remained until his retirement in 1970. Bill Phillips served on the College Committee from 1953 to 1960 as representative of the Old Students' Association of which he was President from 1956 to 1958, was re-appointed in his own right in 1967, and served until 1981 on our Governing body. He was on Finance Committee from 1955 until 1978, Planning and Buildings Committee from 1955 to 1969, the Fellows Committee from 1969 to 1980 and has responded to our approaches whenever we have asked him to serve on various other Committees and Sub-Committees. For three years he was Chairman of the former Managing Committee until its demise in 1969. He was made a Fellow of the College in 1969. Bill Phillips has been a College man all his life and has given unstintingly of his time, wisdom and experience. There are few lay members, if any, who have ever given so much over so long a period.

The College was indeed fortunate to be able to interest Sir Francis Sandilands in the Treasurership when it became vacant in 1973. During the ensuing eight years his task was especially onerous, since after 1974 the College experienced a continuing decline in its resources. We shall long have cause to be grateful to Sir Francis for his skilful guidance over those years which has braced the College against the potential blizzards of the future. We greatly regret the retirement of so outstanding a Treasurer and wish him every happiness in the future. (Elsewhere in this Report reference is made to the election of Sir Francis as an Honorary Fellow of the College.)

OBITUARY

We record with regret the death during the year of a number of members and former members of the College. They include eight Fellows of the College.

The College mourns the death of Professor Joel Hurstfield who died suddenly, in America, on 29 November 1980, at the age of 69. When he had retired, as Astor Professor of English History in September 1979, it was arranged that his retirement should be spent partly as Senior Research Fellow at the Huntington Library, San Marino, California, and partly in London, where he intended to be a frequent visitor to University College. It is a matter of great sadness to his many friends here that this will not now take place. Professor Hurstfield began his connection with College as a student in 1931. He took a First in History in 1934, and became a research student under Sir John Neale. He went to University College, Southampton, as an Assistant Lecturer in 1937, but had it not been for the war he would probably have embarked on a political career and sought election as a Labour Member of Parliament. In 1942 he became Official

Historian in the offices of the War Cabinet, and arising from this work he wrote his first important book, *The Control of Raw Materials* (published in 1953). After the war he became a Lecturer at Queen Mary College, before returning to University College in 1951. He succeeded Mark A. Thomson as Astor Professor in 1962 and became one of the leading figures in College and University life, and one of the country's most distinguished historians. He was a Fellow of the College, as he was Chairman of the Department of History and Dean of the Faculty of Arts. He sat on every important committee in College. He was a witty and kindly University orator, a prolific and incisive writer, lecturer and broadcaster, and with his eloquent teaching of undergraduates and his learned direction of the post-graduate seminar in Tudor history at the Institute of Historical Research, he was a remarkable upholder of this College's traditions of scholarship and distinction.

Franz Sondheimer FRS who had been Professor of Chemistry and Royal Society Research Professor at the College since 1967, died in February 1981 aged 54. Born in Stuttgart in 1926, he came to England with his family in 1937, and was educated at Highgate School and Imperial College. After gaining research experience at Imperial College, he went to Harvard and from there to the post of Assistant Director of Research for Syntex Pharmaceuticals. His achievements there include the syntheses of cortisone, testosterone, and northisterone, a potent oral progesterone. He became Head of the Organic Chemistry Department of the Weizmann Institute of Science in 1956 and returned from there to the United Kingdom in 1964 as Royal Society Professor of Chemistry at Cambridge. In 1967 he was elected a Fellow of the Royal Society and in the same year he came to University College. His achievements in synthetic organic chemistry were numerous, but he will probably be remembered most for the syntheses of annulenes, large ring analogues of benzene. He had a wide range of interests outside science, including solo flying, music and collecting scientific books.

We were saddened by the sudden death on 22 June 1981 of Professor J. A. C. Thomas at the age of 58. He came to the College in 1965 as Professor of Roman Law and added lustre to that most distinguished Chair. Educated at Bridgend County Grammar School and at Trinity College, Cambridge, he proceeded in 1949 to a lectureship in Law at Nottingham University; in 1954 he moved as a Senior Lecturer to the University of Glasgow and was appointed Douglas Professor of Civil Law in that University in 1957, a Chair which he held until he moved to University College. His war service included service with the Intelligence Corps, Psychological Warfare Branch, and with the Allied Commission in Austria. Tony Thomas was an outstanding scholar in his chosen field, and his reputation was widely recognised not only in the United Kingdom but also abroad, especially in civil law countries where he frequently lectured and participated at international conferences. These activities received fitting recognition by the award to him in 1974 of the Italian Gold Medal for cultural distinction. His scholarly contributions to the study of Roman Law were both numerous and influential and his new edition of Justinian's Institutes and his Text Book of Roman Law, published respectively in 1975 and 1976, can be said to have set the seal on his lasting influence on

the study and understanding of Roman Law. Tony Thomas was particularly concerned with the role of Roman Law and its influence on modern law and this enabled him to present a most stimulating view of a subject which might otherwise tend to be viewed by English law students as a somewhat arid field. He also maintained a deep interest in English Law and was joint author with Professor J. C. Smith of Nottingham of *A Case Book on Contract,* a work immensely popular amongst students and which is just due to appear in its seventh edition. His loyalty, both to the College and to his own Faculty and Department, was unequalled and he was a tireless worker on College committees. He will be sorely missed.

Professor S. E. Dicker died in University College Hospital on 9 December 1980. Born in Brussels in 1904, he graduated M.D. with 'Grande Distinction' in 1930. He escaped from occupied Belgium in 1941 and in 1943 joined Hans Heller in Bristol. He came to College in 1950 having been invited by Professor Frank Winton to apply for a lectureship in Pharmacology. Here he established himself in a distinguished line of pharmacologists, while maintaining the interest in physiology which he had acquired in the early years. In 1962 he was appointed Head of the Biomedical Departments at Chelsea College where he stimulated expansion and formation of separate Departments of Biochemistry and Pharmacology. Over many years he maintained connections with the College as an Honorary Research Associate and later an Honorary Research Fellow in our Department of Pharmacology, transferring in 1973 to the Department of Chemistry with a Leverhulme Emeritus Fellowship. Professor Dicker was known internationally for his antidiuretic assay. His later experimental work at College on the kidneys of rats may prove, however, to be his most significant.

Sir Jules Thorn, who died on 12 December 1980 was one of University College Hospital Medical School's munificent benefactors. The Sir Jules Thorn Charitable Trust provided the School and Hospital with a whole-body CT scanner and contributed to the cost of building the Rayne Institute in University Street. The Trust also helped to establish the present academic Department of Mental Health, with a grant to cover salaries for a period of seven years, and set up a special Endowment Trust for a long-term research project into schizophrenia at Friern Hospital. Sir Jules was a member of the School Council from 1973 to 1978.

Professor H. E. Watson, Ramsay Memorial Professor of Chemical Engineering from 1934 to his retirement in 1951, died on 24 September 1980 aged 94. He was educated at Marlborough College and University College London and was awarded an 1851 Exhibition in 1909. After working with Sir William Ramsay he gained further research experience in the Universities of Berlin, Geneva and Cambridge, working for a time in the Cavendish Laboratory. In 1911, shortly after inventing the neon glow lamp, he took up the post of Assistant Professor of Inorganic and Physical Chemistry at the Indian Institute of Science, Bangalore, and in 1916 was appointed to the chair on the retirement of his former teacher, Dr M. Travers. From 1939 to 1945 he was engaged at the Admiralty and on his return to the College after the war was faced with the problem of rebuilding and refitting his department, which had been destroyed by enemy action. He was a man of untiring energy. He remained scientifically active through-

out his long retirement, taking an intense interest in such subjects as the fluoridization of drinking water, to which he was utterly opposed, and the ageing properties of tooth enamel. He was elected Fellow of University College London in 1914, at the early age of 28, and since 1977 had been the Senior Fellow.

Other Fellows who died during the year were Professor S. T. Bindoff, Emeritus Professor of History, Queen Mary College, London; Sir Bernard Keen, formerly Director, East African Agriculture and Forestry Research Organisation, formerly Assistant Director and Head of Soil Physics Department, Rothamstead Experimental Station, and Director, Imperial Agricultural Research Institute, India; Dr G. F. Marrian, formerly Director of Research, Imperial Cancer Research Fund, sometime Professor of Biochemistry, University of Toronto, and Professor of Chemistry in Relation to Medicine, University of Edinburgh; Mrs Philippa P. Martin, Consulting Surgeon Western Ophthalmic Hospital, formerly Hunterian Professor, Royal College of Surgeons; Mr G. Qvist, Surgeon, Royal Free Hospital, Willesden General Hospital, and Royal National Throat, Nose and Ear Hospital; and Dr G. S. Sansom formerly Honorary Research Assistant in Embryology at the College.

Few deaths can have been recorded of staff who served the College so long as that of Mr F. H. J. Davidson who died on 16 November 1980. 'Dave', as he was so affectionately known by nearly everyone here, served the College in the Accounts Department from 1924 until 1972 and was Deputy Accountant from 1963 until the time of his retirement. His knowledge of the College and its staff was phenomenal and his every-ready advice and help gave him a special place in the affection of his colleagues.

P. Venning, a member of the Anatomy Department for thirty-two years from 1946 to 1978 died on 19 January 1981.

We were saddened by the premature death of Dr D. J. Wills, a member of the Dental School, on 23 December 1980. He was appointed as a Research Fellow in 1972 and became a Senior Lecturer in March 1976.

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APPENDIX I

NUMBERS OF STUDENTS 1980–81*

	Under-graduate	*Post-graduate*	*Total*
Faculty of Arts	1,393 (95)	411 (161)	1,804 (256)
Department of Political Economy	306 (0)	21 (3)	327 (3)
Slade School of Fine Art	108 (0)	113 (8)	221 (8)
	1,807 (95)	545 (172)	2,352 (267)
Faculty of Science	1,449 (4)	†566 (169)	2,015 (173)
Faculty of Medical Sciences	317 (0)	—	317 (0)
Faculty of Engineering	463 (0)	228 (55)	691 (55)
Faculty of Laws	310 (14)	158 (47)	468 (61)
Faculty of Environmental Studies	159 (1)	231 (50)	390 (51)
Faculty of Clinical Sciences	483 (0)	45 (31)	528 (31)
	4,988 (114)	ϕ1,773 (524)	6,761 (638)

* As at 31 December 1980.

† This figure includes 86 full-time and 41 part-time students working in the College Faculty of Medical Sciences who were registered in the University Faculty of Science.

ϕ Of this number, 1,009 full-time students and 353 part-time students were registered for higher degrees of the University of London; the remainder were working for higher diplomas of the University or of the College, or for the higher degrees of other Universities or were engaged in research work, or attending post-graduate lecture courses.

The figures in brackets indicate the number of part-time students included in the above total under each head.

APPENDIX II

UNIVERSITY FIRST DEGREE AND DIPLOMA AWARDS

1 OCTOBER 1980 – 30 SEPTEMBER 1981

FACULTY OF ARTS

B.A. Degree	*1st Class Honours*	*2nd Class Honours Upper Div.*	*2nd Class Honours Lower Div.*	*3rd Class Honours*	*Pass*	*Total*
Anthropology & Geography	–	–	2	–	–	2
Archaeology	–	1	–	–	–	1
Classics	3	1	4	–	–	8
Classics & Ancient History	–	2	–	–	–	2
English	2	15	30	7	–	54
Fine Art	3	12	6	2	–	23
French	4	12	11	–	–	27
Geography	3	20	25	3	–	51
German	1	4	6	2	1	14
Hebrew Literature & Jewish History	–	–	1	1	–	2
History	3	35	14	2	–	54
History of Art	–	9	4	–	–	13
Latin	–	2	2	1	1	6
Linguistics	–	4	6	1	–	11
Medieval Archaeology	–	3	5	–	–	8
Modern Iberian & Latin American Regional Studies	–	5	8	2	–	15
Philosophy	2	13	12	–	–	27
Scandinavian Studies	1	1	4	–	–	6
Ancient History & Social Anthropology	–	4	1	1	–	6
English & History of Art	–	5	5	–	–	10
French & History of Art	1	–	2	–	–	3
French & Linguistics	–	–	2	–	–	2
French & Philosophy	–	1	–	–	–	1
German & History of Art	–	–	–	1	–	1
History & History of Art	–	1	1	–	–	2
Italian & History of Art	–	2	–	–	–	2
Philosophy & Economics	–	–	6	–	–	6
	23	152	157	23	2	357

B.A. Degree (Aegrotat)	*Pass*	*Total*
	1	1

FACULTY OF LAWS

LL.B. Degree	*1st Class Honours*	*2nd Class Honours Upper Div.*	*2nd Class Honours Lower Div.*	*3rd Class Honours*	*Pass*	*Total*
	1	34	45	7	1	88

FACULTY OF MEDICINE

Basic Medical Sciences and Pharmacology Examination: 128 Students passed.
Second Examination for Dental Degrees: 48 Students passed.
M.B., B.S. Degrees: 114 Students passed, including 4 with distinctions.
B.D.S. Degree: 45 Students passed, including 7 with honours.

FACULTY OF SCIENCE

B.Sc. Degree	*1st Class Honours*	*2nd Class Honours Upper Div.*	*2nd Class Honours Lower Div.*	*3rd Class Honours*	*Pass*	*Total*
Anthropology	3	10	12	—	—	25
Anthropology & Geography	—	—	5	—	—	5
Applied Physics	1	1	3	3	—	8
Architecture	7	12	23	8	3	53
Astronomy	3	2	5	4	—	14
Astronomy & Physics	1	2	8	5	1	17
Biochemistry	—	10	7	3	—	20
Biology	—	1	1	—	—	2
Botany	—	3	4	—	—	7
Chemistry	6	13	10	3	2	34
Chemistry & Physics	—	1	—	—	—	1
Combined Biological Sciences	—	—	1	—	1	2
Combined Sciences	—	—	1	—	—	1
Computer Science	1	3	2	3	—	9
Computer Science with Electronic Engineering	—	1	—	—	—	1
Genetics & Microbiology	—	2	3	4	—	9
Genetics & Zoology	—	1	—	1	—	2
Geography	—	7	13	1	—	21
Geology	—	1	4	1	1	7
Human Sciences	—	6	6	1	—	13
Mathematics	5	3	11	5	—	24
Mathematics & Physics	3	1	2	2	—	8
Mathematics with Physics	—	—	—	1	—	1
Medicinal Chemistry	2	2	6	3	—	13
Microbiology	3	3	7	4	—	17
Pharmacology	—	3	5	—	1	9
Physics	6	3	5	2	1	17
Physiology	—	9	2	—	—	11
Psychology	3	24	32	3	—	62
Statistics	1	—	1	—	—	2
Statistics & Computer Science	4	2	1	1	—	8
Zoology	1	6	11	2	—	20
	50	132	191	60	10	443

B.Sc. (Intercalated) Degree	1st Class Honours	2nd Class Honours Upper Div.	2nd Class Honours Lower Div.	3rd Class Honours	Pass	Total
Anatomy with Basic Medical Sciences	3	5	1	—	—	9
Biochemistry with Basic Medical Sciences	—	—	1	—	—	1
Biomedical Sciences	—	1	—	—	—	1
Genetics and Basic Medical Sciences	2	7	—	—	—	9
History of Medicine and Basic Medical Sciences	—	2	2	—	—	4
Human Biology and Basic Medical Sciences	1	1	—	—	—	2
Immunology and Basic Medical Sciences	1	5	—	—	—	6
Pharmacology with Basic Medical Sciences	4	7	—	—	—	11
Physiology with Basic Medical Sciences	1	4	1	—	—	6
Psychology and Basic Medical Sciences	—	7	4	—	—	11
	12	39	9	—	—	60

FACULTY OF ENGINEERING

B.Sc. (Engineering) Degree	1st Class Honours	2nd Class Honours Upper Div.	2nd Class Honours Lower Div.	3rd Class Honours	Pass	Total
Biochemical Engineering	—	2	1	3	—	6
Chemical Engineering	5	13	5	4	1	28
Civil Engineering	9	13	4	5	2	33
Electronic & Electrical Engineering	8	8	5	6	4	31
Electronic Engineering with Computer Science	—	2	1	3	—	6
Mechanical Engineering	5	4	3	8	3	23
Naval Architecture	4	1	—	—	1	6
	31	43	19	29	11	133

FACULTY OF ECONOMICS

B.Sc. (Economics) Degree	1st Class Honours	2nd Class Honours Upper Div.	2nd Class Honours Lower Div.	3rd Class Honours	Pass	Total
Economics	3	19	31	12	3	68
Economics & Economic History	—	4	4	1	1	10
Economics & Geography	—	7	4	1	—	12
Economics & Statistics	1	1	3	3	—	8
	4	31	42	17	4	98

APPENDIX III

UNIVERSITY HIGHER DEGREE AND HIGHER DIPLOMA AWARDS

1 OCTOBER 1980 – 30 SEPTEMBER 1981

FACULTY OF ARTS

Ph.D. *Bartlett School of Architecture and Planning:* Carlos H. Caminos, James S. Curl. *Egyptology:* Laverne Schnare, Patricia A. Spencer. *English Language and Literature:* Richard H. Brown, Nigel M. Cross, Stephen P. Ellis, Stephen Hazell, Ivor R. Indyk, Nicola J. Ramsay, Jeremy D. Treglown. *Slade School of Fine Art:* Peter J. B. Hames. *French Language and Literature:* Colin W. G. Boswell, Patricia B. Grout. *Geography:* Catherine A. Middleton. *German:* David Malcolm, Heidi H. Robinson. *Greek:* Helen M. Cockle, Mary Mantziou. *Hebrew and Jewish Studies:* Hans J. T. C. Loewenthal, Pinchas Toledano. *History:* Peter Burley, Conrad H. Dixon, Robert S. J. Garland, David Lieberman, Hamish M. Little, Hilda I. Sabato, Andries G. P. van der Walt, Gillian C. Wigglesworth. *Phonetics and Linguistics:* Teresa Ching Yuk Ching, Janina A. Giejgo, Judith L. Klavans-Rekosh, Jane R. McBrearty, Kalaya Tingsadadh. *Scandinavian Studies:* Richard M. Summers. (35)

M.Phil. *Bartlett School of Architecture and Planning:* Alero A. Ayida, Christopher J. Birchall, Susan J. Black, Gillian M. Dawson, Juliana K. Fedorko, Robert P. Flavelle, Nicholas P. Gerrard, John M. Halling, Timothy L. Hancock, Susan D. Harley, John T. Hollinger, Caroline A. Jacobs, Susan W. Janota, Ka-Yin A. Lam, Margo Moehring, Mohamed J. Mohamed, Susan J. Nimchick. *Latin:* Peter A. Hocking. *School of Library, Archive and Information Studies:* Shahin Assayesh. *Philosophy:* George S. Galfalvi, Keith A. McCullock, Zev M. Trachtenberg. *Phonetics and Linguistics:* Elizabeth R. Teixeira. *Scandinavian Studies:* Elizabeth J. Whitelaw. (24)

M.A. *Archaeology:* Rosalyn P. Gee, Jacqueline Kirkwood. *Area Studies:* Muriel G. Brook, Rosa de G. Castorena Sanchez, Roberto I. Escalante Semerena, *Jose O. Espinoza Ferrey, Carlos J. Faillace Carreno, Pushpinder S. Khaneka, Jo-Ellen Myers, Joao A. Pereira de Mello, Steven J. Routh, Jorge Silva Ortiz, Philip D. Somervell, Charles R. Swenson, Katherine A. Tinsley. *Classics:* Stephen G. Arnold. *English:* Carole A. Hough. *German:* Claire Cohen, Alison M. Cooper, Susan E. Daly, Eleonore J. Kells, Conor M. McNamara, Stephen J. Moore, Catharine A. V. Pusey, Neil C. Runcieman, Angela C. Schweitzer, Gillian M. Shipway, Susan Tipler. *Library and Information Studies:* Zan R. B. H. Abdul Rahman, Lucia Bonet Guilayn, Irene Campbell, Carmen Lee Kar Man, Foster M. Chinulu, Marlene Clayton, *Catherine M. Cooke, Sandra Cromey, Sarah A. Falla, Linda J. Fisher, Ruth A. Goldstein, Katherine R. Gommon, Ibrahim B. Ismail, Izumi Kajita, Athanase B. Kanamugire, Fateme Keshavarz, Christopher Leach, Christine L–W Lin, Clare V. Lintel, Sheila M. McClure, Ruth K. Moore, Alice G. Nkhoma, Anne O. Omutere, Howard V. Pierce, Caroline Potter, Soudabeh Samii, Julie H. Strachan, Cathryn J. Townsend, Tunku N. Tuanku Abdul Rahman, Anna Varughese, Janet C. Waddams, Elizabeth R. Webb. *Linguistics:* Florence L. A. Albury, Helen S. Alves, Regina Blass, *Robyn A. Carston, Maria T. Espinal Farre, David J. Landin, Katharine E. Loizeaux, Bernadette Plunkett, Marie C. Poilpre,

Michel Y. F. Reynard, Peter M. Storm. *Phonetics:* Lui Yau Lam, Kathleen J. R. Marsh, Chellakan R. Marthandan, Margaret Miller, Ahmed Mostefai, Gilda M. Suarex Leoni. *Scandinavian Studies:* Anat Arkin, Rowan M. Shaw. (79)

University Postgraduate Diplomas: Archive Studies 13, †Classical Archaeology 1, Fine Art 57, Linguistics 8.

*Awarded Mark of Distinction.
†Awarded 1978–79 but not included in the Annual Report for that Year.

FACULTY OF ECONOMICS

Ph.D. *Laws:* Werner Volkmer. *Political Economy:* Rosalind M. Altmann, Omar H. Chowdhury, Eduardo A. de A. Guimaraes. (4)

M.Sc. *Economics:* Kevin J. Clarke, Carole Dowek, Constantin Gavriiloglou, Peter A. Glassman, Omar Miranda, Sheila M. Scott, Iakovas Stratis, Vincent A. G. Taylor, Maria C. Varnavidou, Georgios Vlachakis, Lee F. Wade. (11)

FACULTY OF LAWS

Ph.D. *Laws:* Michael B. Davies, Ephrain N. Ngwafor. (2)

LL.M. Lawrence N. O. Adjety, Ebrahim M. Ali, Kwaku Anyemedu, Selvaraja Balsubramaniam, Linda N. Beubrun, Adrian Borg Cardona, Tahar Boumedra, Ahmed Bouras, Mohamed Bousoltane, George D. Burke, Barbara Burnett, Richard Camilleri, Susan C. Carpenter, Howard Carter, Delia M. Chatoor, Garry M. Chayko, Delia M. Coonan, Brian B. Deeks, Kenneth M. Dibble, Stanley Eddy, Richard J. Edwards, Beng G. Ee, Antonios Efstratiadis, Sheila C. Fatemi, John A. Giokas, Geoff A. Goldberg, Richard J. F. Gordon, Andreas Haberbeck, Mark I. P. C. Henniker-Major, Margaret Homer, Bola I. Ibidapo-Obe, Alcibiades Iconomou, James H. Isherwood, Sorajak Kasemsuvan, Michael T. Keevy, Kissoondial, Lystra Kodilinye, Ernest H. Koylass, Sheila S. K. Lim, Maria K. Mackenzie, Nik R. B. N. Mahmood, James Mayanja, Stephen W. Mayson, Grace A. Mckoy, Paul T. McNicholas, Michael E. Mitchell, Alec A. Mizzi, Andrew Muscat, Johann H. Nagel, Onueze C. J. Okocha, Agnes I. O. Okwesa, Ong Chin Aun, Ooi Teik Hoe, Leon Paczynski, Constantina Papaioannou, Anna Philalithis-Kountouriotis, Neofytos N. Pirilides, Edeltraud H. Pitroff, Andrew F. Reish, Mohamed-Salah Rezzak, Denis Skaltsas, Lynn Slater, Francis Spagnoletti, Nicholas H. Stone, Richard J. D. Sykes, Tan Poh Choo, Konstantinos Tassiopoulos, Jose C. Tesoro, Herman H. C. Tsoi, Constantinos Vainanidis, Sompol Vanigbandhu, Johan P. Van Niekerak, Tania Vella, Raymond V. Walsh, *William B. Wooding, Petrine E. S. Yap. (76)

University Postgraduate Diplomas: International Law 4, Shipping Law 15,

*Awarded Mark of Distinction.

D.Sc. Garry E. Hunt, Anthony C. Legon, Edward D. Saggerson. (3)

Ph.D. *Anatomy and Embryology:* Najla A. E. Al-Nassar, Gary L. Greenberg, Maher I. Iskandar, Kristjan R. Jessen, Kwong Wing Hang, Christine M. Mckillop, Peter T. Ohara, Francis Voon Chee Tet, Kevin C. P. Wilson. *Anthropology:* Christian C. Clerk, Nicholas C. Dracopoli, Richard O. Fardon, Laurence R. Goldman. *Bartlett School of Architecture and Planning:* Mark G. Gelernter, George Ofori, Milan P. Prodanovic, Charit Tingsabadh. *Biochemistry:* Denis B. Buxton, David H. Edgar, Dylan R. W. Edwards, Asia M. El Hassan, Martin C. Garnett, Rupert C. Honnor, John R. Jenkins, Peter S. N. Rowe, David R. Sargan, John B. Taylor, Alison P. M. Thomas, Felicity Z. Watts. *Biophysics:* David C. Ogden. *Botany and Microbiology:* Grace E. Aguamah, Seyed A. Alavi, Marek R. Walach, Anne Warner. *Chemistry:* Anand Akhila, Fatima A. J. Al-Omran, Peter J. Bougeard, Jeremy R. Campbell, Pavlos N. Christou, Mark R. Draper, Ian A. Duncan, Norman R. D'Urso, Said H. M. Fahmy, Peter J. Goddard, Robert J. Hosie, Akbar A. Khan, Roy Peters, Karamjit Singh, Glyn Stanway. *Clinical Sciences:* Raymond P. Boot-Handford, Angela R. Galpine, Stefan Krywawych. *Computer Science:* Ian R. Hunt, Stephen W. Treadwell. *Genetics and Biometry:* Mary I. Harper, Tam Ping Leung. *Geography:* Stephen J. Daniels, Andrew J. Moffat, John G. M. Parkes, Christopher N. Roberts. *Geology:* Anthony Afejuku, Akomeno U–E J. Oteri, George T. K. Pitman, Lesley M. Sheppard, Luis I. A. Silva Prieto. *History and Philosophy of Science:* Peter J. Austerfield, Marcos B. De. Oliveira. *Mathematics:* Leoni-Anna Dall-Evangelatou, Nikolaos Tamvakis. *Pharmacology:* Gillian M. Burgess, Susan J. Wrigglesworth. *Physics and Astronomy:* Bader N. E. Al-Saqabi, David F. C. Brewer, Stephen A. Briggs, Paul S. Butterworth, Michael Charlton, Wyn Cudlip, Jack R. Giddings, Kevin Giles, Robert C. W. Henderson, Helmut Jakubowicz, Julian F. E. Johnson, Kenneth J. King, Ian M. Mason, Glenn S. G. Pollard, Nicholas J. Veck. *Physiology:* David M. Catley, Jane E. Keeley, Teresa J. Livingstone, David C. M. Taylor, Susan C. Wray, Jill A. Yamey. *Psychology:* Steven A. Griggs, Jean C. Hammond, Robert H. Logie, Francis P. Mckenna, Frances A. Reynolds, Karol P. Szlichcinski. *Statistical Science:* Nathaniel B. Booth. *Zoology and Comparative Anatomy:* Mary P. J. Brenan, Peter J. Crush, Phillip D. Dicker, Robert H. Miller, Richard H. Treisman. (104)

M.Phil. *Biochemistry:* Peter D. Laverack, Salmata R. Zubairu. *Physics and Astronomy:* Duncan J. Mountford. (3)

M.Sc. *Architecture:* Midhat J. Annan, *Denise Y. Arnold, William N. Avery, *Richard M. Burdett, Martin J. J. Butterworth, *William J. Callaway, Roger I. Calvin, Michael J. Corcoran, Robert Davis, John E. F. Evans, Gonzalo Garcia-Huidobro Severin, Christopher L. Gill, Alan G. Hopkins, Siu Y. S. Lau, Tabassom Malek, Hanna Makhlouta, Geoffrey I. Maspero, Daranee Narupiyakul, Michael H. W. Neal, Samuel I. Oji, Nishith R. Parikh, Barry D. Phillis, Akis Phylaktis, Nigel C. Powell, Dimitrios Protopapas, Fatiha Salah-Salah, Theodore Timagenis. *Biochemical Engineering:* Costas A. Antoniades, *Victor J. Falcon Borges. *Biochemistry:* *Richard M. Bayney, Ulla C. Bohman, Jane M. Dunt, Barry N. Evans, Paul D. Messis, Euthimia Vassiliou, Martin White, Alan G. Yates. *Computer Science:* Tom Daniel, Mesut Gunduc, Ho Sooi Hock, Iqbal A. Husain, Graham J. Knight, Kwok Chi-Yuen, Kwok Wai Kwong, Lee Lian Sai, *Peter H. Lisle, Barbara C. Schoop, Stefan K. Stanczyk, Demetrius Svarnus, James F. T. Whitworth, Sarah J. Willcock.

Conservation: Juliet A. Bailey, Peter J. Barfoot, Roy McN. Birch, Christopher J. Broom, *Jane Foster, Richard H. Grove, John A. Irving, Philip Mulholland, Seub Nakhasathien, Charles P. E. Raine, Mary E. Scruby, John J. Tucker. *Educational Psychology:* Louise G. M. Clarke, Norah L. Frederickson, Pamela M. Gavin, David R. Jones, Jennifer M. Lansdell, Margaret A. McFenton, Giles A. Raymond, Roger D. Wickman, Kay E. Wills. *History and Philosophy of Science:* Steven M. Hussain, Bernard W. Matz, Michael A. P. Shortland. *Hydrogeology:* Neal Baker, Marcus S. Chandler, Savas Charalambidis, Tesfaye Chernet, Chong Foo Shin, Jeremy P. Dennis, Bassey N. Ekefre, John J. Elton, Alan M. Higston, Konstantinos Nikas, David B. Whittam. *Marine Earth Science:* Michael J. Collinson, Philippa L. Coyne, Hsiao-Huang Fang, Paul W. D. Grogan, *Christopher S. Jones, *John A. I. Luchford, *Colin A. Wilson. *Micropalaeontology:* Ian P. Evans, Barry G. Fitz-Gerald, Christopher P. Mortimer. *Neurological Science:* Christopher R. Wade. *Social Anthropology:* Maria E. Aramoni Burguete, Talat S. Aslam, Annemarie Broady, Richard S. Hallam, Ianthe M. Maclagan, Jalil B. Miswardi, Jane A. Powell, Roberta W. Sarbacher, John A. M. Simo, Ines A. Smyth. *Statistics:* Ian D. Botterill, Luc C. M. Genevier, Abul K. U. Rob, John Tendes, Jonathan B. Thompson. *Vertebrate Palaeontology:* Lee J. Floyd, Stafford C. B. Howse. (114)

University Postgraduate Diplomas: Physical Anthropology 1.

FACULTY OF ENGINEERING

D.Sc. John B. Davies, Alvin W. Nienow, William G. Price. (3)

Ph.D. *Chemical and Biochemical Engineering:* Lorimer R. Fellingham, Michael Hoare, Peter G. Murfitt, Thrinayani J. Narendranathan, Andrew J. Russell, David J. Salt, Mukund B. Shah, Jeffrey Solomon. *Civil and Municipal Engineering:* Vicente C. M. de Souza, Thomas Hyde, Alan P. Jeary, Georgios M. Zintilis. *Electronic and Electrical Engineering:* Paul Axon, Peter R. Ball, Alvaro D. de Oliveira, John R. F. Guy, Anthony R. Hall, Mamingonians H. Mami, John P. Meeson, Tehseen Rahim, James G. Schoenenberger, Ian R. Smith. *Mechanical Engineering:* Majid A. Al-Sani, Stephen J. Holdbrook, Robert B. Inglis, Pandeli Temarel. *Photogrammetry and Surveying:* Ian J. Dowman, Andreas Georgopoulos, Emmanouel Kapokakis, Maarouf A. Mohamed. (30)

M.Phil. *Civil and Municipal Engineering:* Michael J. Tait. *Electronic and Electrical Engineering:* Allan K. H. Miller, Sein Wang. (3)

M.Sc. *Biochemical Engineering:* Garry I. Bowler, *Philip D. Crichton, Mohammad-Imad A. Fatayer, Andrew M. Sadler, Roger L. Scott, Christopher Turner. *Ergonomics:* Mahdi F. Al-Ahmar, John Martin, †Derek E. Proffitt. *Marine Engineering:* Andrew C. Nicholls, Christopher R. Orton, Geoffrey W. Peat. *Microwaves and Modern Optics:* Emmanuel A. Akat, Mustafa A. R. Al-Mudares, Alkbar H. Bhikoo, Peter R. Chapple, Chua Yok Lee, Denise Consoni, Fereydoun Faridian, Nisatha D. Jayasundere, Sunday H. Juwe, John Koulias, *Jonathan H. Lyle, Alfred Ng Ka Lun, Christakis J. Papakyriacou, Neil Roddis, Nader Saffari, Deepak Ultam. *Naval Architecture:* Colin D. Blackman, Robert Chanter, Anthony Coverdale, Kevin Dillon, Andrew D.

Filby, *Simon N. Hodgson, *Muir Macdonald, Moray H. MacPhail, Richard A. May, Iqbal A. Memon, *Paul A. Oliver, Abdul Rahim Bin Jaafar, *Matthew L. Roberts, *Leong T. See, Subramanian Sivaprakasan. *Ocean Engineering:* Robert J. Allcot, Paul Elkington, *Alan K. Paton, Panicos C. Petrides, Mario P. Rivero Gonzalez, Andreas M. Synesiou, Michael L. F. Tsen. *Photogrammetry:* Samuel N. Agwor, Erle K. V. Anderson, Boniface C. Anidobi, *Richard A. Baldwin, *Richard D. C. Bevis, Peter C. M. Wakoli. *Surveying:* Olawepo J. Adeniyi, *Hilary E. Faull, *Anthea J. Lyle. (59)

FACULTY OF MEDICINE

M.D. Abdulla A. Al-Khader, Gillian C. L. Lachelin. (2)

Ph.D. *Clinical Sciences:* Astrid E. Armstrong, Paul K. Priscott. *Zoology and Comparative Anatomy:* Ermelinda Alves Cardoso, Peter G. E. Kennedy. (4)

M.Sc. *Periodontology:* Dorothy Osabutey-Anikon. *Prosthetic Dentistry:* Yusnidar Tajul Ariffin. (2)

*Awarded Mark of Distinction.
†Awarded 1977–78 but not included in the Annual Report for that year.

APPENDIX IV

COLLEGE DIPLOMA AND CERTIFICATE AWARDS

1 OCTOBER 1980 – 30 SEPTEMBER 1981

FACULTY OF ARTS

Certificate in Archive Administration: Rusnah Johare, Festo Elias Rugakingila Mukerebe, Sarath Sisira Kumara Wickramanayaka. (3)

Diploma in Library and Information Studies: Christine Margaret Abbott, Pamela Mary Ambrose, Richard Timothy Ayres, June Mary Brien, Lillian Jennifer Brown, Helen Elizabeth Chapman, Nicholas John Clapton, Patricia Anne Cochrane, Sheila Margaret Cook, *Margaret Elizabeth Critchley, Katherine Patricia Davenport, Angelique Day, Katherine Dimitrellou, Patricia Duffield, Suzanne Mary Enright, Judith Patricia Geddes, Christopher Goddard, Penelope Jane Greenhill-Hooper, Morag Cooper Greenwood, Catharine Manya Colton Haines, Jane Allison Hay Hald, John William Harrow, Patricia Mary Hewitt, Timothy David Hobbs, Simon John Huxstep, Lina Jaafar, Kathryn Jones, Michael Alan King, Noboru Koyama, Janet Isabel Long, Catherine Mary MacDonald, Ann Malcolm, Mary Clare McDonnell, Mary Bernadette Montague, Richard Humphrey Ansell Osmond, Deirdre Margaret Park, Christine Macdonald Ritchie, Margaret Deanne Rouse-Jones, David Iain Scott, Fiona Mary Shrimpton, Patricia Mary Sigl, George Skretas, Nicola Lesley Smith, Angela Valerie Springate, John Hedley Sutton, Helen Mary Webb, John Michael Wilson, Mieko Yamaguchi, Rosemary Helen Zolynski. (49)

Certificate of Proficiency in Elementary Greek: Amelia Banks, John Patrick Owen. (2)

Certificate of Proficiency in Elementary Latin: Cynthia Pearce Barley, Michael Margrave Chambers, Patrick Joseph Dodd, Kathleen Elizabeth Leddy, Stephen Roy Miller, Lyndal Anne Roper. (6)

Certificate of Proficiency in Phonetics: Karen Abraham, Rosana Arras, Laura Milva Basta, Louise Buchanan, Dheera Chudananda, Gillian Lesley Dewsnap, Gerald Noel Jean-Luc Fromageot, Ingrid Marianne Goilo de Tyrode, Itsuo Haba, Donatella Hodges, Maura Iannelli, Francoise Joyon, Simone Agnes Genevieve Jeuland-Rosendale, Bariza Kadi, Mellissa Sui-Lee Li, Barbara Loveridge, Lui Yau Lam, Wendy Jane Maish, Zoubida Mostefai, Nigel John Nixon, Helen Odamtten, Julia Perez, Maria Isabel Recaman, Lourdes Remon, Alain Jean Louis Rollez, Francisco Javier Sainz de Robles, Guiliana Sartori, Ikuo Shibuya, Shizuko Shinohara, Takako Suzuki, Toshiko Tokuyasu, Latifa Tounsi, Andrew Shiu-Nang Yui. (33)

*Awarded with distinction.

FACULTY OF SCIENCE

Diploma in Conservation: Juliet Ann Bailey, Peter James Barfoot, Christopher John Broome, *Jane Foster, Richard Hugh Grove, John Anthony Irving, Philip Mulholland, Seub Nakhasathien, Charles Peter Everton Raine, John James Tucker. (10)

Diploma in Hydrogeology: Neal Baker, Marcus Stephen Chandler, Savas Charalambidis, Chong Foo Shin, Melinda Anne Cradock-Hartopp, Jeremy Paul Dennis, Bassey Nyong Ekefre, John James Elton, Alan Michael Hingston, Konstantinos Nikas, David Brian Whitham. (11)

Diploma in Micropalaeontology: George Frederick Forsey, Ho Young Lee, Se-Moon Park, Andrew Thomas Riddick, Alastair Roland Thomson, Julian Mark Wade. (6)

Diploma in Statistics: Hans Nicholas Lack. (1)

*Awarded with distinction.

FACULTY OF ENGINEERING

Diploma in Biochemical Engineering: Costas Andreas Antoniades, Garry Ian Bowler, *Philip Dennis Crichton, *Victor Jose Falcon Borges, Mohammad-Imad Abdulla Fatayer, Andrew Michael Sadler, Roger Leslie Scott, Christopher Turner. (8)

Diploma in Chemical Engineering: Naeem Hafiz Nawabi, Kirit Sadgun Patel, Philip William Taylor. (3)

Diploma in Marine Engineering: Roger Clive Baker, Paul Spencer Claridge, Charles McIntosh Kinnell, Andrew Charles Nicholls, Christopher Reginald Orton, Geoffrey William Peat, Keith Raybould. (7)

Diploma in Microwave Engineering: Mustafa Abdul Rahman Al-Mudares, Akhbar Hoosain Bhikoo, Cheryl Sandra Blackmore, Peter Richard Chapple, Denise Consoni, Yves Davaine, Fereydoun Faridian, Nisabha Dharmasiri Jayasundere, Sunday Marrison Juwe, Haroutioum Katchadourian, John Koulias, *Jonathan Henry Lyle, Alfred Ng Kah Lun, Christakis John Papakyriacou, Neil Roddis, Nader Saffari, Vaithalingam Arumugam Thinathayalan, Deepak Uttam. (18)

Diploma in Naval Architecture: Colin David Blackman, Robert Chanter, Anthony Coverdale, Kevin Dillon, Andrew Derek Filby, *Simon Nicholas Hodgson, *Muir Macdonald, Richard Anthony May, Iqbal Ahmed Memon, *Paul Antony Oliver, Abdul Rahim Bin Jaafar, *Matthew Laurence Roberts, *Leong Teck See, Subramanian Sivaprakasam. (14)

Diploma in Ocean Engineering: Robert James Allcott, Paul Elkington, *Alan Kirk Paton, Panicos Constantinou Petrides, Mario Patricio Rivero Gonzalez, Andreas Michali Synesiou, Michael Lip Fui Tsen. (7)

Diploma in Photogrammetry: John Ono Dan Irehovbude, Francis Maxwell Liuma, Andrew Howard Morris. (3)

Diploma in Surveying: Elizabeth Anne Baker, *Alison Patricia Hards, Leigh James Harrison, Stephen James Homewood, Nkemdirim Uzoma Ononiwu, *Andrew Paul Pilditch, Maxwell Bernard Nigel Richards, Peter Stanley Savile, *Tan Vitus. (9)

*Awarded with distinction.

FACULTY OF ENVIRONMENTAL STUDIES

Diploma in Architecture: Miranda Henrietta Archer, Pauline Amanda Barnes, Colin John Buggey, Stephen David Chance, Alison Jane Chappell, Malcolm John Crayton, Andrew Nelson Davison, Wendy Manel De Silva, Rosamund Deborah Diamond, Philip Dryden, Ian Colin Faithfull, Victor Wick Fong, Stephen Paul Gale, Robert Walter Godsill, Mark Tadeousz Grzegorczky, Helen Jane Heslop, Stuart Jonathan Hoare, Richard James Hutchinson, Sheila Margaret Ickringill, Asoka Katakam, Jeremy Hugh Lingard, Renato Francis Lusardi, Alistair James Metcalfe, Sarah Jane Murray-Smith, James Gerard Naughton, Robin William Nicolson, Ikemefuna Ifejika Stanley Okoye, Dannie Onn, Elisabeth Danielle Pacuad, Alan Richard Penn, Daniel John Max Shabetai, Neil Stewart Smith, Patrick Richard Travis, Maria Vassiliadou, Wilfried Wang. (35)

Certificate in Development Planning: Idris Bin Haji Abas, Ibrahim Abdurrahman, Kassim Titjani Ahmed, Khaled Abdallah Albawardi, Marilu Alferez, Nabila Algraffee, Salman Ahmed Al Meer, Sa'ad Saeed Al Mobti, Mohammad Ossaid Al-Sharary, A. Mohamed Ameen, Nirmal Narinder Andrews, Mohd. Nor Bador, Kunthachappi Thathan Bellan, Seetharam Bhat, Yvonne Blaise, Fulin Bolen, Gilberto Cely, Anwar Chaudry, Verachai Chayachinda, Satya Narayana Reo Chellapilla, Job Daniels Cholwe, Namadera Dharmalingam, Guadalupe Espinola, Julian Jr. Esquillo, Jek Swee Fong, Jagdish Chandra Gambhir, Rossevelt Tumpale Ghambi, Arcot Screenivasa Mudaliyar Govinda Raj, Mohd Khalil Haji Mansor, Muhammad Mofazzal Hossain, Muhammad Banna'i Ibrahim, Anselm Kansi Okbrie Ikegwoha, David James Inglis, Rajaraman Chandrasekharan Iyer, Jibgar Joshi, Ramasamy Kamatchi, Inderjit Khanna, Samuel Kikuba, Eberhard Knapp, Lore Koppenhofer, Kumar Kundra, Lam Keong Lim, Yuh-San Liu, Alapatt Joseph Lonappan, Emmanuel Manasa, Paul Royston Mann, Yvonne Patricia Matthew, Emeka Fabian Mbanefo, Francis Peter Mgullu, Felician Mushobozi Muchuruza, Kunnil Gopalan Nadarajan, Neeru Nanda, Ashwari Kumar Narang, Joginder Pal Narang, Md. Abdun Noor, Gibson Jideofo Obidigbo Obika, Joachim Adimachukwu Chukwudum Okafor, Dhruba Narayana Pradhan, Muhammad Akram Raza, Milverton Reynolds, Yusuf Warsama Saeed, M. Shankar, Inder Kumar Sharma, Pravin Chandra Sharma, Virendra Nath Sharma, Alan Nasir Shibira, Anand Manasantosh Shirgaokar, Bal Krishna Shrestha, Katherine Stauraki, Peter Robin Stewart, P. S. A. Sundaram, Dionisio Vio, Rosemary Wangari Wachira, Antonio Zeta, Dietmar Herbert Ziller. (75)

Diploma in Development Planning: Vassiliki Angelidou, Abdullahi Bala Bature, Alcides Antonio Cordero Sierra, Sharadchandra Vishnu Deshpande, Elimina Figueroa Lopez, Raphael Bernard Emmanuel Francis, Beatriz Gonzalez Ibarra, Mohamed Hamed Jaffar, Takao Kakei, Fred Mutayi Khaemba, Neo Mokoto, Gordon Tumwesigye Mwesiegye, Isa Aliyu Ndako, Michael Tarsicius Njuguna Njoroge, Osuade Ajani Oyediran, Risuchol Panityotal, Sonia Perez-Rodriguez, Nora Cristina Pieter Garrido, Alfredo Jose Planchart Brun, Luis Preciado Barragan, Ana Maria Tinoco de Albuquerque Osorio, Maria Eugenia Wong Ponce, Yip Sau Hing. (23)

APPENDIX V

SCHOLARSHIPS, STUDENTSHIPS AND PRIZES COLLEGE AND UNIVERSITY AWARDS

COLLEGE AWARDS

Atchison Exhibition (Clinical Sciences)—L. Corr.
Atchison Scholarship (Clinical Sciences)—S. W. Davies.
Barlow Prize (Electronic and Electrical Engineering)—J. G. Schoenenberger.
Herbert Henry Bartlett Scholarships (Architecture)—R. Hiller, Sarah Williams, T. Croft.
Herbert Batsford Prize (Architecture)—Anne Nicole C. Leonard.
Thomas Witherden Batt Scholarships (Science)—Rosaly M. C. Lopes, M. J. Stead, D. Vakhária, Janet Winter.
Leonard Bayliss Memorial Prize (Physiology)—D. Ross.
Bayliss-Starling Memorial Scholarship (Psychology)—Susan F. Gottlieb.
Francis Perch Bedford Prize (Zoology)—R. Nichols.
Philip Seth Belasco Prize in Medicine—L. Corr, S. W. Davies, R. I. Luder, equally divided.
Boise Scholarships (Fine Art)—Judith Frost, Jane Harris, Sarah Wenden, P. Stafford, Liz Barrett, Carol Robertson, P. Robinson, G. Dudgeon.
Bonney Prize (Geology)—S. L. Kehoe.
R. E. Bradbury Memorial Prize (Anthropology)—Naomi Tripp.
Broderick-Parry Prize (Geography)—Claire Reading.
A. J. L. Cahill Memorial Prize (Political Economy)—S. P. Ball, W. L. Yung, equally divided.
Chadwick Certificate and Prize (Civil Engineering)—Chan Ching Fai.
Lucy Chaplin Prize (Clinical Sciences)—M. F. Parry Davies.
Churchill-Jenkinson Prize (Archive Studies)—Mery R. Foster, Patricia Kelvin, equally divided.
Lilian Clarke Prize (Botany and Microbiology)—Geeti Rao.
Clinton Prize (Electrical Engineering)—D. M. Stimson.
Cowley Prizes (Library and Information Studies)—C. M. Cooke, I. Ismail.
Dawes Hicks Postgraduate Scholarship (Philosophy)—A. J. Newman.
Michael Dawkins Medal—S. W. Davies.
Deans Scholarship (Mechanical Engineering)—Wu You-Sheng.
Dental Surgery Prizes (Clinical Sciences)—R. E. Lewis, D. P. Bush, M. D. Wainwright.
Dental Technology Prize—R. T. Knivett.
Donaldson Medal (Architecture)—B. Ma Siy.
Drapers Company Elective Period Awards (Clinical Sciences)—C. Mattock, A. Tarling.
Early English Text Society's Prize—Halina Sand.
Elliot-Blake Studentships—S. Karlson, D. Vakhária, Yuradee Jiakuntorn, Catherine Moody, Freda Rossouw.
Environmental Design Prize—J. J. Kent.
Esso Chemical Travelling Scholarship (Chemical Engineering)—Susan Vecht.
Fellowes Silver Medal Prize (Clinical Sciences)—J. Du Toit, W. A. Nowlan.
Filliter Exhibition (Clinical Sciences)—P. Martin.
Filliter Elective Period Awards (Clinical Sciences)—D. Kaufman, J. McLelland, S. R. Prince.
Flemming Elective Period Awards (Clinical Sciences)—F. Challoner, L. Fitchett, I. Isaac, M. Leslie, F. Noble.
Sir Banister Fletcher Prize and Medal (Architecture)—Ginette E. Bone.
Flinders Petrie Scholarships in Egyptian Archaeology—Barbara G. Adams.

Daryll Forde Award (Anthropology)—Margaret Batts.
Carey Foster Research Prize (Physics)—M. A. Parker.
Goldsmid Elective Period Awards (Clinical Sciences)—S. J. Berg, V. B. Bhatt, N. P. Bretland, L. Corr, C. Dickenson, F. Docrat, A. N. Fish, M. Flanagan, N. C. W. Hill, R. Holder, R. Kalra, M. Lewis, R. Luder, B. Elsby, J. Jessop.
Eva Grunwald Memorial Prize (French)—Shona Johnson, P. Swanston, equally divided.
Paul Haas Studentships (Biochemistry)—C. A. Orengo.
Violet Hall Prize (French)—Claire Lavery, Ailsa Jones, equally divided.
Hart Prize (Photogrammetry)—A. H. Morris.
Hart Prize (Surveying)—A. P. Pilditch.
Bernard Hart Prize (Clinical Sciences)—S. R. Prince, J. Axford.
Archibald P. Head Memorial Medal and Prize (Mechanical Engineering)—P. H. A. Rose.
Heimann Medal (German)—Susan Johnson.
Henriques Scholarship (Fine Art)—Susan Harlock.
Elsie Hitchcock Prize (English)—Barbara Holcombe.
R. B. Hounsfield Prize in Traffic Engineering—Wong Kwong Hang.
Huntingdon Research Centre Prize (Histology Part 1 – Medical Sciences)—J. L. Rashbass.
Hurst Prize in English Law—J. M. Prosser.
Institution of Civil Engineers Prize—S. Cacoutas.
Institution of Electrical Engineers Prize—D. H. Hague.
Institution of Mechanical Engineers Prize—J. H. Harrison.
Jackson Lewis Scholarships—S. Karlsson, E. R. Love, C. J. Bennett, Rosaly M. C. Lopes, P. McKenna, Brenda M. Bell.
Sir Hilary Jenkinson Scholarship in Archive Studies—R. K. Aspin.
Jevons Memorial Scholarship in Economic Science—B. Raychaudhuri.
Rhianon Jones Memorial Prize (English)—Elizabeth Draper.
Ker Memorial Prize (English)—Doris Myatt.
Kitson Prize (Chemical and Biochemical Engineering)—K. I. Baker.
Dr R. Kohn Prize (Physiology Part 1 – Medical Sciences)—Stella V. S. Tan.
Sir Thomas Lewis Memorial Prize (Clinical Sciences)—S. W. Davies.
Library and Information Studies Exhibitions—Sarah Cole.
Liston Gold Medal Prize (Clinical Sciences)—S. W. Davies.
Sir John MacAlister Medal (Library and Information Studies)—Margaret E. Critchley.
Magrath Scholarship and Fellowes Gold Medal Prize (Clinical Sciences)—L. Corr, R. I. Luder.
H. S. W. Massey Research Prize (Astronomy)—R. E. Cole.
Maxwell Law Prize—P. E. P. Tron.
Medical Sciences Bursaries Fund Scholarships—D. C. Peterson.
Medical Sickness Society Elective Period Awards (Clinical Sciences)—J. Axford, F. McDonald.
Mental Health Research Fund Elective Period Award (Clinical Sciences)—A. Tandy.
Merck Sharp and Dohme Limited Prize (Biochemistry Part 1 – Medical Sciences)—Fiona R. Wakeford.
Merck Sharp and Dohme Limited Prize (Genetics Part II – Medical Sciences)—D. C. Peterson.
Sir William Meyer Prize (Geography)—D. Felsenstein, P. Littlewood, equally divided.
Sir William Meyer Prize (History)—M. E. LeJeune.
Sir William Meyer Essay Prize (Geography)—D. Blow, P. Littlewood, equally divided.
Sir William Meyer Travelling Studentships (History)—Rachel Bischoff, J. Bowen, Jane Fellon, Ann Harding, Elizabeth Holden, J. Morgan, Irene Pelham, Nicola Pollard, Mary Shand.
John Stuart Mill Scholarship in Philosophy of Mind and Logic—A. J. Newman.
Momber Scholarship in Physics—N. D. Lloyd.

Momber Scholarship in Science—R. W. Harper.
Cecily de Monchaux Memorial Prize (Psychology)—Laura H. Goldstein.
Rosa Morison Postgraduate Scholarship in Arts—I. Haywood.
Morley Medal and Prize (Modern English Literature)—Lisa Baxter.
H. B. Murray Memorial Prize (Clinical Sciences)—E. A. Watts, G. J. Cox.
Margaret Murray Prize in Egyptology—Vivien Raisman.
Melvill Nettleship Prize for Figure Composition—Hilary Daltry.
Owings Travelling Scholarship (Environmental Studies)—N. J. Deprez.
Orthodontics and Paedodontics Prize (Clinical Sciences)—H. M. T. Kasasian.
Pathology and Microbiology Dental Prize (Clinical Sciences)—K. A. Hicks.
Catherine Maude Pearce Scholarship for Senior Women Students—Lisa C. Baxter, Alison Thorne.
Perren Studentship (Astronomy)—Linda Smith.
Pharmacology Dental Prizes—V. M. Kennedy, M. D. Wainwright.
Platt Prizes (Greek)—Siobham Harnett, Kate Hughes, Margaret Lauder.
Postgate Prize (Philology)—E. J. Glover.
Harry Poole Prize (Chemistry)—M. L. Wolf.
Quain English Essay Prize—S. Howard.
Ramsay Memorial Medal (Chemistry)—C. E. Dempsey.
Ricardo Scholarship (Political Economy)—B. Raychaudhuri.
Mary Rischgitz Prize (Fine Art)—Celia Paul.
F. T. Roberts and Magrath Scholarship in Obstetrics and Gynaecology Prize—S. W. Davies.
Graham Robertson Travelling Scholarships (Fine Art)—P. Stanley, V. Short, Anne Nicholson.
Robert Ross Scholarship in Fine Art—I. Robertson.
Rosenheim Elective Period Awards (Clinical Sciences)—M. J. Ball, J. Barton, S. W. Davies, A. R. Duncan, J. Gray, G. Kouloumas, A. Korowaska, L. Love, F. McCloghry, M. McShane, H. G. Mistry, C. Moss, H. Murphy, M. McIntyre, M. Perkins, H. Piercy, M. Pike, S. N. Powell, G. Provost, A. Rahemtulla, K. Reynolds, K. M. Roberts, D. A. Rodin, R. A. Rodin, S. Roe, J. Self, J. Selwood, P. Shaw, L. Slater, S. A. Smith, C. Solomons, K. K. Sood, L. Soutter, F. Speed, S. Tabner, S. K. Tay, D. R. Thomas, W. D. Toff, R. P. Verrill, P. J. Wilford, A. P. R. Wilson, A. R. Wright, Deirdre J. Wright, P. G. Y. Wright, C. Reed.
L. M. Rothschild Scholarship in French—A. Leak, A. R. Yamey.
Alfred Sinclair Medal (Clinical Sciences)—N. J. Stools.
Slade Scholarships (Fine Art)—Bhajan Hunjan, Margaret Gillian.
Slade Prizes (Fine Art)—Clare Shepherd, M. Bingham.
Smith, Kline and French Laboratories Limited Prize (Medical Sciences)—J. M. Tyebkhan.
Special Dental Anatomy Prize (Clinical Sciences)—C. L. Pankhurst.
Stevenson Prize (Applied Mathematics)—R. G. H. Avis, M. R. Paulson, equally divided.
Steer Medal and Prize (Fine Art)—M. Shaw.
Suckling Prize in Gynaecology—S. W. Davis.
C. A. R. Tayler Prize (Physics and Astronomy)—Lyn Penfold.
Sir Andrew Taylor Prize in Fine Art—C. Moock.
Sir Andrew Taylor Prize in Architecture—N. A. Lee-Evans.
Henry Tonks Prize (Fine Art)—D. Norris.
Trotter Medal (Clinical Sciences)—W. A. Nowlan.
Troughton Scholarship—M. J. Shaw.
Tuffnell Scholarships (Chemistry)—Kathleen Johnson, Sarah J. Snee.
Tuke Silver Medal Prize (Clinical Sciences)—H. Cater.
Tuke Bronze Medal Prize (Clinical Sciences)—S. Plumley.
A. J. V. Underwood Exhibition (Chemical and Biochemical Engineering)—N. S. Naimer.

I. F. Vernon-Harcourt Prize (Civil Engineering)—Tan Kiat Ting.
Viking Society Prize (Scandinavian Studies)—D. Spade.
F. M. R. Walshe Prize (Clinical Sciences)—D. T. Martin.
Ellen Watson Memorial Scholarship in Applied Mathematics—J. R. Mitchell, A. Onac, T. Charles, equally divided.
Webber Prize (Laws)—J. M. Alderton.
Dr Christopher Whiteside Awards (Clinical Sciences)—P. M. Doyle, S. Powell, Tracey E. Humm, F. Nancy Stellar, Debbie Fairweather, Elaine Sassoon.
Dr T. D. Whittet Prize (Pharmacology Part II – Medical Sciences)—P. McKenna.
Audrey Wykeham Prize (Fine Art)—D. Stubbs.

FACULTY MEDALS AND PRIZES

Arts: Rosa Morison Memorial Medal and Prize—S. J. Walton.
Engineering: Goldsmid Medal and Prize—A. M. Wray.
Environmental Studies: Medal and Prize—G. C. Comely.
Laws: Andrews Medal and Prize—P. E. P. Tron.
Medical Sciences: Medal and Prize—Diana R. Holdright.

SESSIONAL PRIZES

Anthropology: Kaberry Prize—Ruth Hogarth. *Rosa Morison Prize*—Georgina Born. *M. G. Smith Prize*—R. Keenoy.
English: Campbell Clarke Scholarships—S. Howard, Victoria Feaver. *West Scholarship*—Miriam Meerschwamm. *Ifor Evans Prize*—M. Benson.
Fine Art: Coldstream Prize—C. Lea. *Monnington Prize*—K. Maycock.
French: Rosa Morison Prizes—Wendy Maish, Ruth Hansford, Laura Glassoff.
Geography: College Prize—P. T. Hall, Rachel Brackwell, equally divided. *H. C. Darby Prize*—R. P. Cronk. *Maconochie Prize*—Karen O'Hare. *1903 Prize*—Gail P. Bradford. *Sessional Prize*—R. S. Mully.
German: Robertson Prize—Jeanne Johnson. *Willoughby Prize*—Elke Stone.
Greek: Long Prize—Amanda Cater, Kim Duffett, equally divided.
History: Alfred Cobban Prize—Elizabeth C. Musgrave. *Dolley Prize*—M. G. Dixon. *West Prize*—A. S. Mercouris, D. Patterson, equally divided. *Pollard Prize*—A. D. Coates, G. Esnouf, equally divided.
History of Art: Gombrich Prize—Demelza Spargo, J. Kerr, Sue West, equally divided. *Wittkower Prize*—Celia Van Oss, Elizabeth Powers, proxime accessit.
Latin: Key Prize—P. H. Bendy, P. Harrison, equally divided.
Philosophy: Dawes Hicks Scholarships—S. R. Hedges, C. D. Mason. *A. J. Ayer Prize*—G. Ostrolenk.
Phonetics and Linguistics: Harold E. Palmer Prize—Victoria Forbes-Adam. *Alexander Melville Bell Prize*—Pamela E. Morley. *Goldman-Eisler Prize*—Kathryn F. Gracey.
Political Economy: Hume-Lloyd Scholarships—K. J. Blackman, N. Pyrke, E. J. Newell, equally divided, R. C. Holland, D. J. Williams, equally divided. *G. C. Allen Prize*—M. Thompson.
Scandinavian Studies: Crabtree Prize—Fiona Davies.
Spanish and Latin American Studies: Alcala Galiano Prize—Suzanne Copper. *Sessional Prize*—Alison Moscoso.
Laws: Andrews Prizes—J. M. Prosser, R. L. Jacobs, J. W. Sharkey, M. D. Phillips, N. M. Tomkins.

Architecture: Bartlett Prizes—Nathalie A. Bagnoud, M. S. Fage, J. R. Pile.

Anatomy and Embryology: J. A. Young Prize—Amanda Hurst. *N. A. Barnicot Prize*—Sandra Bain, B. Penhale, equally divided.

Biochemistry: Jack Drummond Prize—Danuta E. I. Mossakowska. *Plimmer Prize*—I. Zachary.

Botany and Microbiology: Darwin Prize—J. C. Fagg. *Robert Hooke Prize*—P. Morton. *Huxley Prize in Biology*—Claudia Reekes.

Chemistry: C. K. Ingold Prizes—Elizabeth J. Goodwin, G. P. Proud, A. A. Deaking, R. A. Rottier, equally divided, M. Ali, W. M. Chow, equally divided.

Computer Science: Sessional Prizes—R. Irving, R. J. Beatson.

Geology: Hollingworth Prize—T. R. Charlton. *Chubb Prize*—Vivian G. Russell.

Mathematics: Filon Prize—D. Papageorgiou. *Hill Prize*—M. C. W. Jones. *Jeffery Prize*—M. B. Josephs.

Pharmacology: H. O. Schild Prize—Mary Keen.

Physics and Astronomy: William Bragg Prize—N. A. Hart, A. G. Weeks, equally divided. *Oliver Lodge Prize*—T. H. Buscher. *Wood Prize*—D. P. Brownjohn, S. R. Rosen, equally divided. *Huggins Prize*—S. M. Kanbur.

Physiology: Sanderson Prize—I. Nicholson. *Foster Prize*—J. Blake.

Psychology: Burt Prize—Kathryn E. Snaith. *McDougall Prize*—Margaret J. Rock. *Spearman Prize*—Karen R. Spector. *G. C. Drew Prize*—Sonia M. Livingstone.

Statistical Science: Egon Pearson Prize—G. A. Opie. *Karl Pearson Prize*—Brenda C. Shrewsbury, T. O. Suen, equally divided.

Zoology: Zoology Prizes—T. Enver, Caroline Liddell.

Chemical and Biochemical Engineering: Goldsmid Prizes—S. N. Davies, P. J. Marshall, M. B. Wallace.

Civil and Municipal Engineering: Goldsmid Prizes—S. Khoury, J. S. C. Smith, J. Wing-Fong Tsu.

Electronic and Electrical Engineering: Goldsmid Prizes—Hilary F. Beech, S. Ades, D. W. Baum.

Mechanical Engineering: Goldsmid Prizes—P. L. Bond, A. Chawla, S. K. Rutledge.

Medical Courses — Part I Examination: Drummond Prize in Biochemistry—J. M. Tyebkhan. *Glaxo Prize for Best Aggregate Performance in Part I*—J. M. Tyebkhan. *I.C.I. Prize in Anatomy*—S. F. Journeaux. *I.C.I. Prize in Physiology*—S. J. Bowman.

Medical Courses — Part II Examination: Cluff Prize in Physiology—J. A. Lee. *Cuxson Gerrard Prize in Pharmacology*—S. C. Mital. *Drummond Prize in Biochemistry*—D. C. Peterson. *Elga Prize in General Pathology*—M. R. A. Manford. *Suckling Prize in Neurosciences*—D. S. Gartry. *Wellcome Prize in Human Biology*—Rosemary E. Nyholm. *Wyeth Prize for Best Aggregate Performance in Part II*—Alison F. Lee.

Second Examination in Dental Surgery: Anatomy Prize—K. J. S. Heard, A. Huseyin, equally divided. *Physiology Prize*—Sara A. V. Peile.

UNIVERSITY POSTGRADUATE AWARDS

History: S. P. Ville (1st year). *Philosophy:* H. Upton (3rd year). *Civil Engineering:* R. K. S. Wong (2nd year). *Applied Physics:* H. H. Ip (2nd year). *English:* J. S. Rennie (2nd year). *Biochemical Engineering:* E. D. A. Obeng (2nd year).

APPENDIX VI

BENEFACTIONS, DONATIONS, RESEARCH GRANTS AND CONTRACTS

The College Council makes grateful acknowledgement of the following:

ABBOTT LABORATORIES

£11,500 for the Department of Human Metabolism for studies in muscle protein synthesis and degradation and whole-body protein turnover in surgical patients.

ACTION RESEARCH FOR THE CRIPPLED CHILD

(1) £26,343 for the Department of Human Metabolism for the study of problems of diagnosis and management among patients with amino acid disorders.

(2) £10,360 for the Department of Human Metabolism for the investigation of the metabolism of branched-chain amino acids in muscle in health and disease.

(3) £20,000 for the Department of Paediatrics for the study of the mechanisms determining absorption of lung liquid.

AGRICULTURAL RESEARCH COUNCIL

£18,094 and £6,690 for the Department of Physiology for the study of developmental neurobiology.

AMES LABORATORY

$25,874 for the Department of Electronic and Electrical Engineering for an investigation of ultrasonic transducers used for non-destructive testing.

ANONYMOUS INDUSTRIAL SPONSOR

£684 for the Department of Civil and Municipal Engineering for the study of the effects of a sudden shortage of fuel for transport.

ASTHMA RESEARCH COUNCIL

£3,538 for the Department of Pharmacology for the study of the role of IgG_2 in the anaphylactic reaction.

BICC GENERAL CABLES LIMITED

£8,000 and £1,500 for the Department of Electronic and Electrical Engineering for development work in respect of optical data highway.

BOEHRINGER INGLEHEIM

£1,050 for the Department of Geriatric Medicine for the trial of Tranxene.

BRITISH ACADEMY

(1) £940 for the Department of Anthropology for the publication of New Guinea Highland texts.

(2) £319 for the Department of Greek for the study of the material background of the Homeric poems.

(3) £26,315, £19,457 and £500 for the Department of Greek for work on unpublished Oxyrhyncus Papyri.

(4) £2,000 for the Department of History for the study of modern Brazilian politics.

(5) £1,860 for the Department of History for the study of the politics of immigration control in New York.

(6) £1,558 for the Department of History for the study of international enterprise in the Dominican Republic.

(7) £350 for the Department of History for the study of Anglo-Saxon Sussex.

(8) £800 for the Department of History of Art for the study of Venetian sculpture in the 16th century.

(9) £1,050 for the Department of Latin for the study of Iranian loanwords in Classical Armenian.

(10) £638 for the School of Library, Archive and Information Studies for the study of the calendar of papal letters 1216–1303.

(11) £700 for the Department of Scandinavian Studies for the study of runic and scaldic sources of the Viking Age.

BRITISH DIABETIC ASSOCIATION

£3,535 and £2,820 for the Department of Anatomy and Embryology for the study of autonomic neuropath in experimental and genetic models of diabetes.

THE BRITISH PETROLEUM COMPANY LIMITED

£10,000 for the Department of Chemical and Biochemical Engineering for research on the pyrolysis and combustion of coal/oil droplets.

CAMDEN AREA HEALTH AUTHORITY

£11,000 for the General Practice Unit for the payment of two part-time lecturers and a secretary.

CANCER RESEARCH CAMPAIGN

(1) £11,427 for the Department of Anatomy and Embryology for research on cyclic AMP.

(2) £11,407 for the Department of Anatomy and Embryology for the study of tissue invasion using embryonic and malignant cells.

(3) £10,586 for the Department of Anatomy and Embryology for the study of the decline of haemopoietic stem cells.

(4) £10,569 for the Departments of Anatomy and Embryology, Biochemistry, and Botany and Microbiology to meet additional cost of National Pay Awards on six grants.

(5) £29,170 for the Department of Biochemistry for the biosynthesis and induction of cytochrome P450.

(6) £21,103 for the Department of Biochemistry for the study of the effects of hormones and carcinogens on the interaction of ribosomes with reticular membranes.

(7) £9,937 for the Department of Biochemistry for the study of the pre-replicative phase of saccharomyces cerevisiae using gene cloning techniques.

(8) £14,851 for the Department of Botany and Microbiology for research on anti-mitochondrial agents in cancer therapy and oncogenesis.

(9) £13,992 for the Department of Clinical Pharmacology for the study of nutrition and activation of carcinogens.

(10) £1,500 for the Department of Experimental Pathology for the biosynthesis and translocation of serum albumin.

(11) £4,678 and £677 for the Department of Genetics and Biometry for studies of chromosomes and cell genetics in colon polyps.

(12) £11,028 for the Department of Haematology for studies in erythyroid differentiation in normal and leukaemic human marrow.

(13) £3,096 for the Department of Haematology for the exploitation of long term lymphocyte cultures in patients with cancer.

(14) £1,393 for the Department of Haematology for the study of the function of mononuclear phagocytes and the effect of cytotoxic drugs on their tumours.

(15) £16,120 for the Department of Human Metabolism for 'Skeletal muscle protein turnover in malignant cachexia – an integrated study in experimental animals and man'.

CARDIOTHORACIC INSTITUTE

£300 for the Department of Electronic and Electrical Engineering for the development of an animal activity monitoring unit.

CENTRAL RESEARCH FUND

£2,703 for the Department of Anatomy and Embryology for the purchase of liquid helium rapid freezing apparatus.

CIBA LABORATORIES

£600 for the Department of Oral Surgery for the study of phentolamine injections in dental anaesthesia.

COMMISSION OF THE EUROPEAN COMMUNITIES

£48,645 for the Department of Botany and Microbiology for the study of the mechanism of electron transfer in photosynthetic reaction centres and oxygen evolution by plants.

DARESBURY LABORATORY

(1) £562 for the Department of Geology for the assessment of the usefulness of the JCPDS File.

(2) £7,950 for the Department of Physics and Astronomy for the analysis of the astronomical spectra CCP.

DECCA RADAR LIMITED

£12,000 for the Department of Electronic and Electrical Engineering for research on a new concept of Radome Aerial.

DEPARTMENT OF EDUCATION AND SCIENCE

£15,881 for the Department of Psychology for the development of a diagnostic/remediation procedure for failing readers.

DEPARTMENT OF THE ENVIRONMENT

(1) £66,410, £9,206 and £454 for the Bartlett School of Architecture for the study of decision making for rural areas, Stage 2.

(2) £9,939 for the Bartlett School of Architecture for the study of the structure and economics of the housebuilding industry.

(3) £10,475 for the Bartlett School of Architecture for the study of policies for labour market adjustment.

(4) £8,885 and £674 for the Bartlett School of Architecture for the study of differences in design philosophy influencing 'Buildability'.

(5) £3,497 for the Bartlett School of Architecture for the study of sources of safety data in the construction industry.

(6) £49,268 for the Department of Civil and Municipal Engineering for the study of the relationships between travel patterns and the use of energy in passenger transport.

(7) £34,603 for the Department of Civil and Municipal Engineering for the development of urban accident counter-measures involving monitoring the final stages of the Swindon scheme.

(8) £13,272 for the Department of Civil and Municipal Engineering for the analysis of results of MIRA barrier impact tests.

(9) £4,706 for the Department of Civil and Municipal Engineering for the production of a reference manual on road safety.

(10) £2,940 for the Department of Civil and Municipal Engineering for the study of the effects of the changes in land use on travel by Public Transport.

(11) £18,088 for the Department of Geography for the production of a model to predict ice formation on roads.

DEPARTMENT OF HEALTH AND SOCIAL SECURITY

(1) £5,503,000 for the Department of Mechanical Engineering Bioengineering Centre for research and development in the field of prosthetics, orthotics and related problems.

(2) £149,000 for the Department of Mechanical Engineering Bioengineering Centre.

(3) £32,128 for the Department of Mechanical Engineering for research on fatigue assessment.

(4) £41,480 for the Surgical Unit for the study of electro-surgical coagulation in acute upper alimentary haemorrhage employing liquid electrodes.

DEPARTMENT OF INDUSTRY

(1) £16,560 and £815 for the Department of Mechanical Engineering for the study of ship manoeuvring in non-steady currents.

(2) £12,489 for the Department of Photogrammetry and Surveying for the study of photogrammetric methods in metrology.

THE DRAPERS' COMPANY

£500 for the School of Library, Archive and Information Studies for re-editing and indexing the list of Dr Karl Pearson's archive.

EUROPEAN ASSOCIATION OF REMOTE SENSING LABORATORIES

£7,415 for the Department of Physics and Astronomy for remote sensing applications of Meteosat data.

EUROPEAN SPACE AGENCY

£5,068 and £3,652 for the Department of Physics and Astronomy for the expenses of collaboration in the EXOSAT experiment development programme.

THE EILEEN GRAY BEQUEST

£12,000 for the Slade School for the development of computer techniques for description/manipulation of three-dimensional objects.

HEALTH AND SAFETY EXECUTIVE

(1) £13,788 for the Bartlett School of Architecture and Planning for an investigation of the costs of construction site accidents compared with the costs of construction health and safety practice.

(2) £5,330 for the Department of Geology for the production of 'Standard Particles' for calibration dust-sampling equipment.

HELP THE AGED

£3,300 for the Department of Geriatric Medicine for research into dementia.

JOINT COMMITTEE ON POWDER DIFFRACTION STANDARDS

$6,000 for the Department of Geology for the study of powder data of precursors of liquid crystals.

KING ABDUL AZIZ UNIVERSITY

£108,000 for the Department of Obstetrics and Gynaecology for the study of a preventive approach to the haemoglobinopathies in the Western Province of Saudi-Arabia.

LEUKAEMIA RESEARCH FUND

£23,356 for the Department of Haematology for the study on T-cell structure and function in leukaemia and lymphomas.

THE LEVERHULME TRUST

(1) £16,850 for the Department of English Language and Literature for the completion of a new translation of the Domesday Book.

(2) £39,800 for the Department of Geography for the study of the provision of housing assistance to migrant employees.

MACDONALD-BUCHANAN CHARITABLE TRUST

£500 for the provision of fittings in the Strang Print Room.

MEDICAL RESEARCH COUNCIL

(1) £62,917 for the Department of Anatomy and Embryology for the study of the structure and function of enteric neurones in culture and their interactions with other neurones and effector cells.

(2) £61,131 for the Department of Anatomy and Embryology for anatomical studies of the reticular nucleus.

(3) £55,385 for the Department of Anatomy and Embryology for the study of membrane properties of differentiating nerve and muscle cells.

(4) £45,925 for the Department of Anatomy and Embryology for research on the innervation of blood vessels during development following surgical anastamoses.

(5) £35,414 for the Department of Anatomy and Embryology for the study of mechanisms regulating the development of nerve and muscle connections.

(6) £33,971 for the Department of Anatomy and Embryology for research on hypertrophy of intramural neurons in the intestine of adult mammals.

(7) £31,932 for the Department of Anatomy and Embryology for research on extracellular receptors to purine nucleotides and nucleosides in muscle and nerve.

(8) £28,308, £2,796 and £2,000 for the Department of Anatomy and Embryology for the search for the spatial engram.

(9) £23,321 for the Department of Anatomy and Embryology for the study of the role of the hippocampus in the spatial deficit of old rats.

(10) £15,767 for the Department of Anatomy and Embryology for the analysis of sensory signals in the central nervous system.

(11) £4,386 for the Department of Anatomy and Embryology for the study of small ions during early development of the amphibian embryo.

(12) £1,769 for the Department of Anatomy and Embryology for the study of immunohistochemical and electrophysiological studies of enteric nervones in culture.

(13) £330 for the Department of Anatomy and Embryology for the study of the role of cyclic AMP dependent protein phosphorylation in the regulation of the differentiation of muscle.

(14) £299 for the Department of Anatomy and Embryology for studies of membranes of smooth muscle cells.

(15) £36,172 for the Department of Biochemistry for the study of factors influencing the sensitivity of adipocyte processes to adenosine, glucagon and adrenergic agents.

(16) £36,007 for the Department of Biochemistry for the study of molecular mechanisms controlling the expression of ribosomal cistrons in amphibian development.

(17) £26,281 for the Department of Biochemistry for research on antigens of pseudomonas aeruginosa.

(18) £25,448 and £1,909 for the Department of Biochemistry for the construction of recombinant DNA molecules.

(19) £400 for the Department of Biochemistry for studies of cell cycle in saccharamyces cerevisiae.

(20) £37,407 for the Department of Biophysics for research on synaptic transmission from rods to bipolar and horizontal cells.

(21) £14,817 for the Department of Chemistry for the study of the nerve growth factor from guinea-pig prostate.

(22) £12,923 for the Department of Chemistry for the structure activity, and evolution of proteins and the conformations of substances affecting the nervous system.

(23) £25,278 for the Dental School for investigation into the biological control mechanisms within dental plaque.

(24) £22,345 for the Department of Geriatric Medicine for physiological studies of thermoregulatory control in the elderly.

(25) £2,000 for the Department of Genetics and Biometry for the study of links between inherited markers and traits of biological importance.

(26) £134,929 for the Department of Haematology for fluorescent cell sorting antenatal diagnosis, bone marrow stem cell isolation and detection of Ca cells.

(27) £17,693 for the Department of Haematology for the production of human monoclonal antibodies for eventual clinical use using EB virus transformation of lymphoid cells.

(28) £17,145 for the Department of Obstetrics and Gynaecology for the study of the effect of amniocentesis and liquor drainage on pulmonary development in macaque monkey.

(29) £23,023 and £7,492 for the Department of Paediatrics for the detection of brain damage in newborn infants by ultrasound.

(30) £2,000 for the Department of Paediatrics for the study of the transport of amino acids across paraplacental membranes.

(31) £12,008, £3,126 and £865 for the Department of Pharmacology for the investigation of cholinergic synapses.

(32) £342 for the Department of Pharmacology for stoichiometry of ligand-receptor binding, etc., in a secretory system.

(33) £44,869 for the Department of Physiology for research on the build-up and decline of potassium around active neurones.

(34) £26,376 for the Department of Physiology for research on calcium transients in mammalian ventricular muscle.

(35) £22,500 for the Department of Physiology for the study of the regulation of intra-cellular sodium and its effects on the electrical and mechanical properties of cardiac muscle.

(36) £19,484 for the Department of Physiology for research on the mechanisms underlying secondary hyperalgesia.

(37) £16,882 and £1,082 for the Department of Physiology for intracellular studies of long-lasting changes in excitability of cortical neurones.

(38) £16,524 for the Department of Physiology for the study of calcium binding proteins in muscle and the origin of 'Labile energy in muscle contraction'.

(39) £12,834, £1,060 and £754 for the Department of Physiology for the calorimetric study of energy changes during ATP hydrolysis.

(40) £9,593 and £3,381 for the Department of Physiology for studies of the mechanism of muscular contraction.

(41) £8,695 and £16.40 for the Department of Physiology for the measurement of the excitability changes of motoneurones.

(42) £7,925 for the Department of Physiology for the study of physiological and biochemical processes in intact living muscle.

(43) £3,600 for the Department of Physiology for studies of the fine structure of muscle fibres previously subjected to experimental procedures.

(44) £26,894 for the Departments of Physiology and Chemistry for research on pharmacologically active peptides from bee venom.

(45) £21,948 for the Department of Psychology for the study of the mechanisms of spatial interpolation and acuity in the visual perception of movement.

(46) £58,973, £500 and £183 for the Department of Zoology and Comparative Anatomy for the study of the immunology of the nervous system.

MIGRAINE TRUST

£1,741 for the Department of Physiology for the investigation of the relationship between spreading cortical depression and migraine.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

£27,558 for the Department of Clinical Pharmacology for the study of the effects of low dosage exposure to enzyme inducing pesticides and food contaminant.

MINISTRY OF DEFENCE

(1) £10,000 for the Department of Computer Science for the investigation of internetworking techniques for packet-switched communications.

(2) £19,797 for the Department of Electronic and Electrical Engineering for the study of direct optical sensing of acoustic radiation fields.

(3) £15,669, £378 and £153 for the Department of Electronic and Electrical Engineering for the realisation of microwave circuit functions using acoustic surface waves.

(4) £15,325 and £14,423 for the Department of Electronic and Electrical Engineering for the study of active phased array techniques.

(5) £15,210 for the Department of Electronic and Electrical Engineering for the determination of the interaction of surface and longitudinal waves with defects.

(6) £9,736 for the Department of Electronic and Electrical Engineering for the deposition of zinc oxide films for Saw and Bulk acoustic wave devices.

(7) £7,849 for the Department of Electronic and Electrical Engineering for the investigation of ultrasonic waves in powder metallurgy disc alloys.

(8) £3,575 for the Department of Electronic and Electrical Engineering for the study of elastic wave velocity measurements for calculating residual stress.

(9) £450 for the Department of Electronic and Electrical Engineering for the study of P-wave scattering by surface topography.

(10) £250 for the Department of Electronic and Electrical Engineering for a feasibility study of energy transfer of acoustic modes generated in a complex structure.

(11) £110 for the Department of Electronic and Electrical Engineering for the null steering and adaptive array study.

(12) £3,822 for the Department of Mechanical Engineering for the calculation of ship slamming esponse.

MUSCULAR DYSTROPHY ASSOCIATION OF AMERICA

(1) $37,368 for the Department of Biophysics for research on beta-bungarotoxin as a molecular probe for studying transmitter release at the neuro-muscular junction.

(2) $19,500 for the Department of Biophysics for a Fellowship.

(3) £10,445 for the Department of Human Metabolism for the measurement of muscle protein turnover by the use of stable isotope labelled amino-acids in normal man and patients with muscle disease.

(4) $16,500 for the Department of Physiology for a Fellowship.

(5) $15,500 for the Department of Zoology and Comparative Anatomy for a Fellowship.

(6) $15,500 for the Department of Zoology and Comparative Anatomy for research on cell surface markers and neuronal subclasses.

MUSCULAR DYSTROPHY GROUP OF GREAT BRITAIN

(1) £15,541 for the Department of Anatomy and Embryology for *in vitro* culture of primary chick myoblast.

(2) £7,065 for the Department of Anatomy and Embryology for research on the influence of electrical stimulation on muscles of dystrophic mice.

(3) £6,230 for the Department of Anatomy and Embryology for research on the membrane properties of slow and fast muscles.

(4) £17,606 for the Department of Biophysics for research on satellite muscle cells.

(5) £29,281 for the Department of Human Metabolism for the physiological measurement of muscle function.

NATIONAL FUND FOR RESEARCH INTO CRIPPLING DISEASES

(1) £27,695 and £2,037 for the Department of Mechanical Engineering for the shapeable matrix project.

(2) £11,993 and £888 for the Department of Physiology for the determination *in vitro* of the heat of splitting of phosphorylcreatine in muscle.

NATIONAL KIDNEY RESEARCH FUND

£13,136 for the Department of Community Medicine for the study of urinary citrate in renal acidosis.

NATIONAL RESEARCH DEVELOPMENT CORPORATION

£34,599 for the Department of Electronic and Electrical Engineering for the development of the gas medium acoustic microscope.

NATURAL ENVIRONMENT RESEARCH COUNCIL

(1) £796 for the Department of Anatomy and Embryology for studies on the behaviour of the Indian millipede.

(2) £27,996 for the Department of Botany and Microbiology for analysis of plant interaction in a blanket bog community.

(3) £44,212 for the Department of Geography for the study of the hydrology of 'impermeable' urban surfaces.

(4) £7,947 for the Department of Geology for studies of crustal structure near the Outer Hebrides.

(5) £7,200 for the Department of Genetics and Biometry for the study of niche breadth in relation to genetic polymorphism.

(6) £35,089 and £8,000 for the Department of Physics and Astronomy for studies of the Earth's radiation budget.

(7) £5,000 for the Department of Physics and Astronomy for geological studies of Mars and preparation for a NASA Venus mission.

(8) £3,379 and £1,617 for the Department of Physics and Astronomy for the comparative study of surface processes and crustal evolution on the terrestrial planets.

NORTH ATLANTIC TREATY ORGANISATION

(1) B. francs 90,000 for the Department of Chemistry for microwave and millimetre wave spectroscopy of H-bonded dimers.

(2) B. francs 32,500 for the Department of Chemical and Biochemical Engineering for the study of sources of nuclei in crystallization solution.

THE NUFFIELD FOUNDATION

(1) £2,294 for the Department of Botany and Microbiology for research on the dynamics of the natural regeneration of oak and beech.

(2) £6,825 for the Department of Physiology for a Science Research Fellowship.

PHILIPS RESEARCH LABORATORIES

(1) £6,600 for the Department of Electronic and Electrical Engineering for the analysis of guiding structures.

(2) £34,805 for the Department of Electronic and Electrical Engineering for the study of thin-film optical planar filters.

THE PLESSEY COMPANY LIMITED

£2,000 for the Department of Electronic and Electrical Engineering for research on multimode optical fibre hydrophones.

PLESSEY RESEARCH (CASWELL) LIMITED

£1,000 for the Department of Electronic and Electrical Engineering for research on microwave coplanar couplers.

THE POST OFFICE

£50,697 for the Department of Electronic and Electrical Engineering for the study of the application of scanning acoustic microscopy to micro-electronics.

ROCHE PRODUCTS LIMITED

£19,000 for the Department of Chemistry for research on Pappenheimer's Factor S.

ROCKWELL INTERNATIONAL SERVICE CENTER

$8,000 for the Department of Electronic and Electrical Engineering for the study of Mode Structure in SAW resonators using laser probes.

ROWLAND FOUNDATION INC.

$55,000 for the Department of Anatomy and Embryology for visual cortical research in monkeys.

ROYAL NATIONAL INSTITUTE FOR THE DEAF

£64,000 for the Department of Surgery for a Research Fellowship.

THE ROYAL SOCIETY

(1) £6,467 for the Department of Botany and Microbiology for kinetic EPR analysis of photo-chemical reactions in plants.

(2) £22,269 for the Department of Physics and Astronomy for the Mr and Mrs John Jaffé Donation Research Fellowship.

RUTHERFORD LABORATORY – SRC

£90,000 for the Department of Computer Science for network communications with the U.S.A.

RUTHERFORD AND APPLETON LABORATORIES

£30,474 for the Department of Physics and Astronomy for an experiment to observe beauty particles selected by muonic decay in emulsion.

SIR HALLEY STEWART TRUST

£6,012 for the Department of Obstetrics and Gynaecology for staff support for a clinical and experimental study of haemoglogin E/Thalassaemia.

SCIENCE AND ENGINEERING RESEARCH COUNCIL

(1) £126,968 for the Department of Anatomy and Embryology for the study of organisation of the visual cortical areas in the monkey.

(2) £43,628 for the Bartlett School of Architecture and Planning for research on interaction of task illuminance, vertical illuminance and luminaire luminance on lighting adequacy.

(3) £43,323 for the Bartlett School of Architecture and Planning for the study of morphology of building complexes.

(4) £55,388 for the Department of Biochemistry for the study of the transcription of an eucaryotic gene.

(5) £21,390 for the Department of Biochemistry for the construction and analysis of pseudomonas plasmids carrying chromosomal genes.

(6) £5,985 for the Department of Biochemistry for the function of mitochondrial calcium-binding Geycoprotein.

(7) £52,880 for the Department of Botany and Microbiology for Centriole morphogenesis and microtubule organisation in Marsilea.

(8) £23,961 for the Department of Botany and Microbiology for the structure, organisation and assembly of microtubules in the mitotic spindle.

(9) £62,977 for the Department of Botany and Microbiology for the characterisation of the electron donors in photosynthetic reaction.

(10) £37,533 for the Department of Botany and Microbiology for the study of photochemical reactions in the green sulphur bacteria.

(11) £29,431 for the Department of Botany and Microbiology for the study of membrane potential ion transport and membrane fluidity in bacterial motility and chemotaxis.

(12) £92,763 for the Department of Chemical and Biochemical Engineering for kinetics and stabilities of biocatalysts in multi-liquid phase reactions.

(13) £71,614 for the Department of Chemical and Biochemical Engineering for pilot-scale fermentation.

(14) £42,031 for the Department of Chemical and Biochemical Engineering for studies of the effect of shear on membrane-bound enzymes and on proteins.

(15) £34,256 for the Department of Chemical and Biochemical Engineering for research on mixing, gas-liquid mass transfer and rheology.

(16) £27,908 for the Department of Chemical and Biochemical Engineering for research on binary gas diffusion in porous catalysts.

(17) £10,084 for the Department of Chemical and Biochemical Engineering for a Senior Visiting Fellowship.

(18) £9,976 for the Department of Chemical and Biochemical Engineering for studies of pollutant formation and abnormal combustion processes in hydrocarbon flames.

(19) £8,568 for the Department of Chemical and Biochemical Engineering for fluidization under pressure.

(20) £399 for the Department of Chemical and Biochemical Engineering for research on the crystallization and precipitation from solution.

(21) £44,145 for the Department of Chemistry for studies of the excitation profiles of Raman bands of a variety of inorganic and other species.

(22) £27,047 for the Department of Chemistry for spectroscopic study of bonding in ruthenium and related complexes.

(23) £18,650 for the Department of Chemistry for photolysis of pentamethylcyclopentadienylmetallic compounds.

(24) £18,150 for the Department of Chemistry for the study of critical temperatures and pressures and phase equilibria in the critical region for fluid mixtures.

(25) £17,664 for the Department of Chemistry for the metal clusters with nitrogen hydride ligands.

(26) £17,450 for the Department of Chemistry for EXAFS studies of disorder in crystalline solids.

(27) £17,200 for the Department of Chemistry for synthetic applications of novel reactions involving vicinal dionions.

(28) £17,200 for the Department of Chemistry for the total synthesis of Germacrones and related sesquiterpenes.

(29) £16,500 for the Department of Chemistry for high resolution molecular electronic microscopy.

(30) £14,900 for the Department of Chemistry for research on ion transport in solid state electrolytes.

(31) £9,150 for the Department of Chemistry for chemical polarization of nitrogen – 15 nuclei in nitration and related reactions.

(32) £29,030 for the Department of Civil and Municipal Engineering for improved techniques for design and operation of signal-controlled road junctions.

(33) £27,837 for the Department of Civil and Municipal Engineering for the modelling of structure deformation of fronts of cars under asymmetrical impact.

(34) £21,336 for the Department of Civil and Municipal Engineering for the estimation of trip matrices from volume counts.

(35) £6,705 for the Department of Computer Science for the preparatory study towards the UNIVERSE project into digital systems.

(36) £17,500 for the Department of Electronic and Electrical Engineering for research on a new concept of Radome Aerial.

(37) £5,179 for the Department of Electronic and Electrical Engineering for research on optical fibre inertial navigation systems.

(38) £2,930 for the Department of Mathematics for a Visiting Fellowship.

(39) £38,225 for the Department of Mechanical Engineering for research on the dynamic response of hovercraft in regular seas.

(40) £590,000 for the Department of Physics and Astronomy for geophysical and astronomical research in space.

(41) £201,282 for the Department of Physics and Astronomy for image processing.

(42) £187,520 for the Department of Physics and Astronomy for Film Analysis 1981–82.

(43) £93,810 for the Department of Physics and Astronomy for astronomical applications of CCDs; (a) direct imaging and spectroscopy; (b) use with IPCS.

(44) £76,827 for the Department of Physics and Astronomy for Dynamics Explorer Interferometer.

(45) £59,482 for the Department of Physics and Astronomy for interactive planetary image processing system, phase 3.

(46) £52,930 for the Department of Physics and Astronomy for an Advanced Fellowship.

(47) £48,950 for the Department of Physics and Astronomy for the Counter-Hybrid Programme 1981–84.

(48) £45,165 for the Department of Physics and Astronomy for high resolution Doppler Imager on NASA Spacelab study phase.

(49) £29,985 for the Department of Physics and Astronomy for a balloon programme of infra-red astronomy.

(50) £25,162 for the Department of Physics and Astronomy for HRDI study phase for UARS and Spacelab – continuation grant.

(51) £24,819 for the Department of Physics and Astronomy for observations with the IPCS on the Palomar and Las Campanas telescopes.

(52) £23,234 for the Department of Physics and Astronomy for Film Analysis equipment 1980.

(53) £20,000 for the Department of Physics and Astronomy for the I.U.E. Project.

(54) £19,208 for the Department of Physics and Astronomy for positronium formation cross-section for gases (equipment).

(55) £17,764 for the Department of Physics and Astronomy for studies of the composition and structure of the atmospheres of the major planets.

(56) £17,750 for the Department of Physics and Astronomy for interactions of hadrons, nuclei and quarks.

(57) £17,520 for the Department of Physics and Astronomy for the classical trajectory Monte Carlo models of ion-ion collisions.

(58) £17,100 for the Department of Physics and Astronomy for solar maximum studies.

(59) £14,107 for the Department of Physics and Astronomy for a Senior Visiting Fellowship.

(60) £9,400 for the Department of Physics and Astronomy for the study of the collapse of interstellar gas clouds.

(61) £9,100 for the Department of Physics and Astronomy for the study of low energy atom-scattering.

(62) £6,964 for the Department of Physics and Astronomy for a Senior Visiting Fellowship.

(63) £5,000 for the Department of Physics and Astronomy for the study of the focal plane sub-system for the Hipparcos Satellite.

(64) £4,750 for the Department of Physics and Astronomy for the study of electron collisions with positive ions.

(65) £4,061 and £1,519 for the Department of Physics and Astronomy for observations at UKIRT.

(66) £3,300 and £352 for the Department of Physics and Astronomy for observations at AAO.

(67) £2,846 for the Department of Physics and Astronomy for a Visiting Fellowship.

(68) £2,417 for the Department of Physics and Astronomy for observations at SAAO.

(69) £2,348 for the Department of Physics and Astronomy for observations at Kottamice – investigation of interstellar CN lines of sight.

(70) £2,187 for the Department of Physics and Astronomy for a Senior Visiting Fellowship.

(71) £2,175 for the Department of Physics and Astronomy for observations at Chili NS/14/81/1 stars with inconsistencies between visible spectral type and U.V. colour indices.

(72) £2,073 for the Department of Physics and Astronomy for observations at SAAO S/1.9/81/1/15 interstellar features in reddened stars.

(73) £1,891, £1,420, £1,254, £413 and £404 for the Department of Physics and Astronomy for observations at AAT.

(74) £1,878 for the Department of Physics and Astronomy for observations at AAT A/81/1/9: the dynamics of the gas in CCLA and NGC 5253.

(75) £1,500 for the Department of Physics and Astronomy for Film Analysis 1981 – 82 (Removal of Bessy machines from Durham to UCL and disposal of SAAB machines.)

(76) £1,379 for the Department of Physics and Astronomy for observations at Lick Observatory.

(77) £1,288 for the Department of Physics and Astronomy for observations at UKIRT U/71/1/18: 2 X 10 micron mapping of a new Herbig Hars complex on Orion.

(78) £1,062 for the Department of Physics and Astronomy for observations at SAAO of OB super giants in the Magellanic clouds.

(79) £933 for the Department of Physics and Astronomy for observations at Hale Observatories.

(80) £871 for the Department of Physics and Astronomy for observations at SAAO.

(81) £810 for the Department of Physics and Astronomy for a Senior Visiting Fellowship.

(82) £750 for the Department of Physics and Astronomy for the expenses of participation in the I.U.E. Project.

SOCIAL SCIENCE RESEARCH COUNCIL

(1) £800 for the Department of Anthropology for the study of themes in Papua New Guinea Highlands ethnography.

(2) £258 for the Department of Anthropology for the study of marriage alliance and group formation in East Cameroon.

(3) £100 for the Department of Anthropology for conference travel expenses.

(4) £9,425 for the Bartlett School of Architecture for research on aspects of the growth of owner occupation 1890 – 1939.

(5) £2,199 for the Bartlett School of Architecture for the study of employment and mobility in inner urban areas.

(6) £44,514 for the Bentham Committee for the preparation for the definitive edition of the collected works of Jeremy Bentham.

(7) £27,240 for the Department of Geography for the study of the influences of social changes on eutrophication of Lough Erne since 1850.

(8) £15,638 for the Department of Geography for the study of labour migration within multi-locational organisations in Britain.

(9) £12,108 for the Department of Phonetics and Linguistics for the Amazon languages project.

(10) £3,433 for the Department of Phonetics and Linguistics for research on the scope of the Lexicon.

(11) £2,442 for the Department of Phonetics and Linguistics for a linguistic study of 'Clitics'.

(12) £386 for the Department of Psychology for the study of social-psychological aspects of unemployment.

THE SPORTS COUNCIL/SOCIAL SCIENCE

£24,183 for the Department of Psychology for the study of leisure and the unemployed.

STANDARD TELECOMMUNICATION LABORATORIES LIMITED

£7,000 for the Department of Electronic and Electrical Engineering for research on Rotman lenses.

STELLA AND ALEXANDER MARGULIES CHARITABLE TRUST

£3,000 for the Department of Hebrew and Jewish Studies for the purchase of special books.

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

(1) £5,000 for the Department of Computer Science for the part-cost of Data Link UCL – Norway.

(2) £2,125 for the Department of Electronic and Electrical Engineering for the study of pulsed eddy-current testing techniques.

(3) £7,805 for the Department of Geography for the study of stable isotopes in natural carbonates.

(4) £2,375 for the Department of Physics and Astronomy for research into atomic collisions relevant to fusion.

UNITED STATES AIR FORCE

$24,500 for the Department of Electronic and Electrical Engineering for the study of high precision IF phase shifters.

UNITED STATES PUBLIC HEALTH SERVICE

(1) $4,200 for the Department of Anatomy and Embryology for the study of the control of somatosensory transmission.

(2) $20,162 for the Department of Chemistry for the study of the three-dimensional structure of protein molecules.

(3) $54,244 for the Department of Zoology and Comparative Anatomy for the study of the immunogenetic regulation of T-macrophage interaction.

(4) $27,644 for the Department of Zoology and Comparative Anatomy for the regulation of immune responses by specific factors.

(5) $5,000 for the Department of Zoology and Comparative Anatomy for a Fellowship.

THE WELLCOME TRUST

(1) £3,152 for the Department of Anatomy and Embryology for the study of the role of the neurotransmitter in the development of the neuromuscular junction.

(2) £1,940 for the Department of Anatomy and Embryology for the study of the retino-geniculate projection in hamsters.

(3) £3,081 for the Department of Anatomy and Embryology for a Research Fellowship.

(4) £435 for the Department of Anatomy and Embryology for the study of the development of cholinergic and adrenergic innervation of certain blood vessels of the rabbit (vacation scholarship).

(5) £26,755, £5,335 and £3,081 for the Department of Biochemistry for the investigation of the rapid stimulation of mitochondrial energy production by triiodothyronine.

(6) £50,000 for the Department of Clinical Pharmacology for the study of age nutrition and toxic mechanisms.

(7) £1,500 for the Department of Clinical Pharmacology for drug studies in asthma.

(8) £30,392 for the Department of Experimental Pathology for the study of the translocation of newly synthesised secretory proteins in cell-free systems.

(9) £20,203 for the Department of Experimental Pathology for the study of subcellular localisation of receptor mediated phosphatidylinositol breakdown in mast cells and neutrophils.

(10) £20,243 for the Department of Haematology for investigation into the cellular interactions and regulation of antibody responses in man.

(11) £5,334 for the Department of Obstetrics and Gynaecology for a Fellowship for the clinical and experimental study of haemoglobin E/Thalassaemia.

(12) £9,150 for the Oncology Group for the study of the role of monocytes in immune suppressor mechanisms in humans and mice.

(13) £7,000 for the Department of Pharmacology for laboratory conversions.

(14) £2,524 for the Department of Pharmacology for the study of neurotransmitter systems and the actions of analgesic agents.

(15) £38,880, £1,827 and £750 for the Department of Physiology for the investigation of proteins in cerebro-spinal fluid and brain during foetal development.

(16) £20,303 for the Department of Physiology for the study of mechanisms of normal and Parkinsonian muscle tremor.

(17) £4,254 for the Surgical Unit for the study of 5-hydroxytryptamine in platelets.

(18) £33,729 for the Department of Zoology and Comparative Anatomy for the role of the major histocomputibility complex of the mouse in gliding T-cell subsets.

(19) £4,180 for the Department of Zoology and Comparative Anatomy for studies of defined neural cells in culture.

(20) £7,275 for the Department of Zoology and Comparative Anatomy for a Fellowship.

WESTLAND HELICOPTERS LIMITED

£4,850 for the Department of Electronic and Electrical Engineering for a study on the measurement of mechanical strain and vibration.

GIFTS TO THE LIBRARY

BAKER AND MCKENZIE FOUNDATION

A donation of £1,326 to help purchase the Berman Collection of Russian Law.

BRITISH-AMERICAN ARTS ASSOCIATION

156 volumes of contemporary American small press poetry books.

PRINCESS DESPINA KARADJA

133 volumes in the field of Byzantine art and early Christian and mediaeval art.

MR J. LUNZER

18 volumes of rare Hebraica.

MR ALEXANDER MARGULIES

A donation to enable the Library to purchase 300 books from the library of the late Dr Yeshayahu Schachar relating to the Hasidic movement (see also page 181).

DR ADA POLAK

20 volumes for the Scandinavian Library.

PROFESSOR EDWARD SARMIENTO

A collection of 200 books.

UNION TEXAS PETROLEUM EUROPE AND MIDDLE EAST INC.

Donation of £100.

MRS R. C. WRIGHT

An Icelandic manuscript calendar.

APPENDIX VII

COLLEGE ACCOUNTS 1980–81
(INCLUDING FACULTY OF CLINICAL SCIENCES)

The Balance Sheets and the Income and Expenditure Accounts for the year will be found on pages 186–9.

BALANCE SHEET

LIABILITIES
The Capital Reserve reflects a net increase of £101,190 due mainly to repayment of the Rayne Institute loan.

ASSETS
Freehold and Leasehold Land and Buildings decreased by £292,999 mainly reflecting the net effect of transferring part of the Gower Street properties to the Long Term Maintenance Fund.

TRUST FUNDS
The College holds endowments in the form of 289 separate trust funds with a total value of £2,845,723. The funds yielded a total income from investments of £324,600.

INCOME AND EXPENDITURE

EXPENDITURE for the year exceeded INCOME by £272,986. The net deficit carried forward on the Income and Expenditure Account was £63,085.

Income exceeded that for 1979–80 by £7,567,364. Grants from the Court of the University increased by £3,691,043. Fees increased by £1,445,787 and grants for research increased by £1,964,232.

Expenditure, including allocations to and from Reserves, was £8,120,290 more than in 1979–80. An additional £6,112,634 net was spent on academic departments and services. Maintenance of premises cost an additional £844,452 net. An additional £468,338 net was spent on administration, and miscellaneous expenditure increased by £694,866 net.

Income and expenditure under the main classifications in 1980–81 as compared with 1979–80 and with the corresponding year of the previous quinquennium, are shown in the following table.

	1975–76		1979–80		1980–81	
	£	%	£	%	£	%
EXPENDITURE						
Salaries and Pensions of Teaching Staff	6,381,326	33.7	10,852,161	32.6	13,595,895	32.9
Departmental Expenses, including Library	4,301,036	22.7	6,987,683	21.0	8,392,351	20.3
Research Grants	3,420,683	18.1	6,593,264	19.8	8,557,496	20.7
Maintenance of Premises	2,909,414	15.4	5,737,530	17.3	6,581,982	15.9
Administration	1,256,416	6.6	1,986,642	6.0	2,454,980	5.9
Other	672,057	3.5	1,090,016	3.3	1,784,882	4.3
	£18,940,932	100.0	£33,247,296	100.0	£41,367,586	100.0
INCOME						
Endowments	159,165	0.8	331,642	1.0	338,429	0.8
Grants	13,970,220	73.2	20,578,640	61.4	24,269,683	59.1
Donations	358,127	1.9	731,176	2.2	854,069	2.1
Fees	924,315	4.8	4,497,123	13.4	5,942,910	14.5
Grants for Research	3,420,683	17.9	6,593,264	19.7	8,557,496	20.8
Research Training Support Grant	58,885	0.3	64,776	0.1	64,886	0.1
Other	197,890	1.1	730,615	2.2	1,067,127	2.6
	£19,089,285	100.0	£33,527,236	100.0	£41,094,600	100.0

EXTRA-BUDGETARY ACTIVITIES

The College administers the finances of many research projects supported from outside sources. 602 were being pursued actively at 31 July 1981. Income and expenditure increased from £6,593,264 in 1979–80 to £8,557,496 in 1980–81.

UNIVERSITY COLLEGE LONDON
BALANCE SHEET AS AT 31 JULY 1981
(EXCLUDING FACULTY OF CLINICAL SCIENCES)

1980 £		*1981* £	£
	FIXED ASSETS		
17,159,685	Freehold Land and Buildings		16,863,170
407,046	Leasehold Land and Buildings		402,487
17,566,731			17,265,657
3,381,098	INVESTMENTS at lower of cost and Market value		3,485,393
20,947,829			20,751,050
	CURRENT ASSETS		
215,140	Stores	219,785	
2,464,162	Expenditure Recoverable from Grants	1,863,477	
1,799,103	Debtors and Amounts Paid in Advance	1,650,867	
800,000	Short-Term Cash Deposits	5,050,000	
40,594	Cash at Bank and in Hand	49,909	
5,318,999		8,834,038	
	Less: CURRENT LIABILITIES		
(490,270)	Bank Overdraft	(876,782)	
(2,042,118)	Creditors and Accruals	(3,249,918)	
2,786,611	NET CURRENT ASSETS		4,707,338
23,734,440	NET ASSETS		25,458,388
2,329,009	TRUST FUNDS		2,530,580
£26,063,449			£27,988,968
	REPRESENTED BY:		
17,091,876	Capital Reserve		17,079,083
714,251	Other Reserves		548,747
3,649,674	Provisions		4,502,176
777,893	Balances carried forward on Revenue Grants		1,314,305
1,500,746	Earmarked Funds		2,014,077
23,734,440			25,458,388
2,329,009	TRUST FUNDS		2,530,580
£26,063,449			£27,988,968

NOTES

Freehold and Leasehold Land and Buildings

(a) Freehold and leasehold land and buildings in the accounts do not include fixtures, furniture and equipment. The cost of these assets is written out of the accounts on purchase or on completion of a project against the corresponding grants or other monies received and are not therefore included in capital account.

(b) Freehold land and buildings are stated at a valuation made in 1959 on the basis of the then current land values and building costs with subsequent additions at cost on a basis which excludes professional fees. No depreciation is charged because an annual allocation is made to long-term maintenance fund.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31 JULY 1981 (EXCLUDING FACULTY OF CLINICAL SCIENCES)

1979–80 £		1980–81 £	£
	INCOME		
18,061,026	Grants from University Court		21,307,637
4,184,827	Fees		5,492,593
272,453	Endowments		260,342
704,612	Donations		818,304
5,616,224	Grants for Research		7,192,196
63,651	Research Council Training Support Grants		64,286
123,246	Contributions for Services Rendered		142,680
37,526	College Properties – Rents Receivable		19,199
22,889	Appropriation from Special Funds		24,492
228,043	Interest Receivable		259,020
58,578	Miscellaneous		54,426
156,616	Provision for Salary Awards at 1 August 1980		399,530
795,131	Allocation from Reserves at 1 August 1980		694,550
£30,324,822			36,729,255
	EXPENDITURE		
1,742,473	Administration	2,198,282	
19,765,622	Academic Departments	24,800,395	
948,255	Academic Services	1,152,689	
5,079,816	Maintenance of Premises	5,487,900	
194,607	General Education Expenditure	220,460	
405,280	Student Facilities and Amenities	537,468	
402,990	Miscellaneous	464,042	
298,792	Capital Expenditure met from Income	285,213	
399,530	Provision for Salary Awards	67,698	
–	Provision for Future Reorganisation	320,000	
744,550	Allocation to Reserves at 31 July 1981	1,387,789	
£29,981,915			36,921,936
342,907	EXCESS OF INCOME (EXPENDITURE) FOR THE YEAR		(192,681)
(147,124)	ACCUMULATED SURPLUS (DEFICIT) AT 1 AUGUST 1980		195,783
£195,783			£3,102

FACULTY OF CLINICAL SCIENCES
BALANCE SHEET AS AT 31 JULY 1981

1980 £		1981 £	£
	FIXED ASSETS		
1,682,140	Freehold and Leasehold Land and Buildings and Related Fixtures and Fittings		1,690,215
1,972,218	Rayne Institute Building and Related Fixtures, Equipment and Furniture		1,972,218
11,644	Minibuses		11,644
3,666,002			3,674,077
1,876,385	INVESTMENTS at lower of cost and Market Value		1,846,514
5,542,387			5,520,591
	CURRENT ASSETS		
15,792	Stores	15,530	
415,629	Debtors and Amounts Paid in Advance	1,074,630	
727,409	Bank Deposit Accounts	36,016	
59,568	Cash at Bank and in Hand	5,501	
1,218,398		1,131,677	
	Less: CURRENT LIABILITIES		
(612,900)	Creditors and Accruals	(219,084)	
605,498	NET CURRENT ASSETS		912,593
£6,147,885	NET ASSETS		£6,433,184
	REPRESENTED BY:		
3,003,978	Capital Reserve		3,117,961
19,893	Other Reserves		(53,406)
143,922	Provisions		206,259
—	Balances carried forward on Revenue Grants		13,486
96,718	Earmarked Funds		38,468
2,883,374	Donation and Trust Funds		3,110,416
£6,147,885			£6,433,184

NOTES

Freehold and Leasehold Land and Buildings

(a) Freehold and leasehold land and buildings in the accounts include certain fixtures, furniture and equipment. The cost of these assets is written out of the accounts on purchase or on completion of a project against the corresponding grants or other monies received and are not therefore included in capital account.

(b) Freehold land and buildings are stated at cost on a basis which excludes professional fees. No depreciation is charged because an annual allocation is made to long-term maintenance fund.

FACULTY OF CLINICAL SCIENCES
INCOME AND EXPENDITURE ACCOUNT
FOR THE YEAR ENDED 31 JULY 1981

1979–80 £		1980–81 £	£
	INCOME		
2,496,542	Grants from University Court		2,961,291
21,072	Computer Board Grant		755
312,296	Fees		450,317
59,189	Endowments		78,087
26,564	Donations		35,765
963,040	Grants for Research		1,365,300
1,125	Research Council Training Support Grants		600
54,699	Contributions for Services Rendered		54,886
18,000	College Properties – Rents Receivable		21,023
45,018	Miscellaneous		39,562
—	Provision for Salary Awards at 1 August 1980		52,309
£3,997,545			£5,059,895
	EXPENDITURE		
192,824	Administration	214,513	
2,989,865	Academic Departments	3,851,048	
118,002	Academic Services	154,591	
637,835	Maintenance of Premises	654,421	
7,665	General Education Expenditure	15,828	
39,662	Student Facilities and Amenities	76,103	
49,752	Miscellaneous	56,106	
4,907	Capital Expenditure met from Income	32,256	
—	Provision for Salary Awards	71,848	
20,000	Allocation to Reserves at 31 July 1981	13,486	
£4,060,512			5,140,200
(62,967)	EXCESS OF EXPENDITURE FOR THE YEAR		(80,305)
77,085	ACCUMULATED SURPLUS AT 1 AUGUST 1980		14,118
£14,118	BALANCE CARRIED TO BALANCE SHEET		£(66,187)